

VISIT...

LANZAROTE
Caliente.COM

- Murra, J. V., El "control vertical" de un máximo de pisos ecológicos en la economía de las sociedades Andinas. In J. V. Murra (ed.), *Visita de la Provincia de León de Huánuco en 1562*, Universidad Nacional Hermilio Valdizán, Huánuco, Peru, 1972.
- Oblitas-Poblete, E., *Cultura Callaway*, Talleres Graficos Bolivianos, La Paz, 1963.
- Oblitas-Poblete, E., *La Lengua Secreta de los Incas*, Los Amigos del Libro, La Paz, 1968.
- Oblitas-Poblete, E., *Plantas Medicinales en Bolivia*, Los Amigos del Libro, La Paz, 1969.
- Otero, G. A., *La piedra mágica. Vida y costumbres de los Indios Callahuayas de Bolivia*, Instituto Indígenista Interamericano, México, D.F., 1951.
- Stark, L. R., Machaj-juyai: secret language of the Callahuayas. *Papers in Andean Linguistics*, I (1972) 199 - 227.
- Rydén, S., Andean excavations I - II. *Monograph Series*, Nos. 4 and 6, Statens Etnografiska Museum, Stockholm, 1957 - 1959.
- Thomas, R. B., Human adaptation to a high Andean energy flow system. *Ph.D. Dissertation*, Pennsylvania State University, 1972.
- Tschopik, H., The Aymara. In *Handbook of South American Indians*, Vol. II, Smithsonian Institution, Washington, 1946, pp. 501 - 573.
- Wassén, S. H., A medicine-man's implements and plants in a Tiahuanacoid tomb in Highland Bolivia. *Etnologiska Studier*, Vol. XXXII, The Ethnographic Museum, Göteborg, 1972.

INVENTORY OF PLANTS USED IN TRADITIONAL MEDICINE IN TANZANIA. I. PLANTS OF THE FAMILIES ACANTHACEAE-CUCURBITACEAE

INGA HEDBERG and OLOV HEDBERG

Department of Systematic Botany, University of Uppsala, P.O. Box 541, S-751 21 Uppsala (Sweden)

POSANYI J. MADATI

Government Chemical Laboratory, P.O. Box 164, Dar es Salaam (Tanzania)

KETO E. MSHIGENI

Department of Botany, University of Dar es Salaam, P.O. Box 35060, Dar es Salaam (Tanzania)

E. N. MSHIU

Traditional Medicine Research Unit, Muhimbili Medical Centre, P.O. Box 20693, Dar es Salaam (Tanzania)

GUNNAR SAMUELSSON*

Department of Pharmacognosy, University of Uppsala, Biomedicum, P.O. Box 579, S-751 23 Uppsala (Sweden)

(Received July 3, 1981; accepted August 24, 1981)

Summary

Sixty-two plants are listed, which are used by traditional healers in the northeastern part of Tanzania. For each species are given: the botanical name with synonyms, vernacular name, collection number, locality, habitus, approximate distribution, and medical use. Results of a literature survey are also reported, including medical use, isolated constituents and pharmacological effects.

Introduction

Traditional medicine is an important part of the health-care system of Tanzania. In spite of an extensive programme to create health centers and to train Rural Medical Aids and Medical Assistants, the traditional healer is still the only medical practitioner available, within reasonable distance, to many Tanzanians living in the rural parts of the country. The number of traditional healers has been estimated to about 30 000 to 40 000, in com-

*To whom enquiries should be sent.

parison with about 600 Western-trained doctors, most of whom are working in hospitals in the big cities. Most of the healers use various parts of plants from the local flora as remedies. Only a small number of these plants have hitherto been identified. Haerdi (1964) identified 625 plants used by healers in villages around the town of Ifakara in central Tanzania. The Government Chemical Laboratory in Dar es Salaam has compiled a list (not published) of about 500 plants used in traditional medicine in various parts of Tanzania. Kokwaro (1976) has published a book listing plants used in traditional medicine in East Africa (Kenya, Tanzania and Uganda), but unfortunately the occurrence of the plants in the various countries is not mentioned.

This paper reports the results of an inventory of plants used by traditional healers in the districts of Handeni, Lushoto, Korogwe, Same and Tanga in the northeastern part of Tanzania. A literature review is also included, comprising reported medicinal uses, isolated constituents and pharmacological studies.

Methods

One of the main difficulties in making an inventory of plants used by traditional healers is that the healers usually keep their knowledge of the plants secret and are unwilling to reveal it to outsiders. In this respect Tanzania offers unique opportunities since it has been possible to use the political organization of the country to get in touch with the healers and persuade them to cooperate in the project. Thus, the first step in the planning of an expedition to a certain area was to enlist the help of the local political leaders to talk to the healers in the area and inform them of the subsequent arrival of a scientific expedition. The healers had to be convinced that their cooperation was of great benefit to the country and, at the same time, that their revelation of their knowledge of medicinal plants to the members of the expedition would not in any way interfere with the continued practice of their art. The political leaders were very successful in this task and secured the cooperation of a great number of healers.

The healers were interviewed as to what plants they used (vernacular name), plant parts used, preparation of the remedies, diseases treated and dose and regimen of the drugs. They were then asked to show the growing plants to the members of the expedition. Plant specimens were taken for botanical identification and subsequently pressed. Each plant was given a TMP number (TMP = Tanzania Medicinal Plant); six herbarium specimens were prepared for each plant. Samples were also taken of the plant parts used by the healers. These samples were intended for future phytochemical and pharmacological screening and were dried in the sun as rapidly as possible. Roots, tubers and other plant parts containing water, were cut to smaller pieces to facilitate drying.

The herbarium specimens were preliminarily identified at the Herbarium, University of Dar es Salaam. Definitive identification was

performed at the Herbarium, Royal Botanic Gardens, Kew, Great Britain. One set each of the herbarium specimens has been deposited at the herbaria at Kew, University of Uppsala, University of Dar es Salaam, the Government Chemical Laboratory, Dar es Salaam, and The Traditional Medicine Research Unit, Muhimbili Hospital, Dar es Salaam. Plants of these collections are referred to by their respective TMP numbers as given in this and following papers. The definitive botanical identifications were performed by the Department of Systematic Botany, University of Uppsala. Data on synonymy and distribution have been extracted from a number of recent African floras, such as *Flora of Tropical East Africa*, *Flora of West Tropical Africa*, *Flora Zambesiaca*, etc., as well as from numerous taxonomic revisions and from manuscript notes and annotations in the Kew Herbarium.

A literature survey of the identified plants was performed at the Department of Pharmacognosy, University of Uppsala. The main information sources were *Chemical Abstracts* Vols. 1 - 92 (1907 - 1980), and the monographs of Haerdi (1964), Kerharo and Adam (1974), Kokwaro (1976) and Watt and Breyer-Brandwijk (1962).

Results and discussion

Two expeditions were undertaken. The first took place during two weeks in November - December, 1978, and covered the districts of Lushoto (two villages), Korogwe (four villages) and Tanga (four villages). Participants were: O. Hedberg, C. Markström, E. Nilsson and G. Samuelsson, University of Uppsala, Sweden; P. J. Madati, Y. Pawa and H. Pazi, Government Chemical Laboratory, Dar es Salaam; E. N. Mshiu and R. L. A. Mahunnah, Traditional Medicine Research Unit, Muhimbili Hospital, Dar es Salaam; B. Mhoro and W. R. Mziray, Department of Botany, University of Dar es Salaam. During this expedition 103 healers were interviewed and 167 plant samples collected. The second expedition was launched in November - December, 1979, for two weeks in the districts of Handeni (six villages) and Same (three villages). Participants were: O. Hedberg and G. Samuelsson, University of Uppsala; P. J. Madati and Y. Pawa, Government Chemical Laboratory, Dar es Salaam; E. Mshiu and R. L. A. Mahunnah, Traditional Medicine Research Unit, Muhimbili Hospital, Dar es Salaam; B. Mhoro and Suleman, Department of Botany, University of Dar es Salaam. Seventy-one healers were interviewed and 104 samples collected.

All healers were interviewed, but for various reasons it was not possible to obtain plant material from all of them. The total of 271 specimens collected was obtained from 114 healers. The number of plants given by each of these healers varied from 1 to 16. The interviews showed that the healers knew more plants than the ones we were able to collect. Several reasons account for the relatively low number of plants obtained from each healer. Not all the plants that the healer knew were available at the time of the year when the interviews were performed. Many healers lived a fairly

large distance from the village where the interview was performed and were not able to find all the plants they used within a reasonable distance from this place. The time which the expedition could stay in one village was limited. That one healer may know and use a considerable number of plants is evident from a study by Harjula (1980), who spent 9 months with one healer in Kikatiti village, 32 kilometers from Arusha on the way to Moshi, Tanzania. This healer alone used 130 different plants in his practice.

It is thus evident that a reasonably complete survey of all the plants used by the healers, even in only one district, would require a much bigger investment of time, personnel and money than could be raised for these two expeditions.

One question in a survey of this kind is to what extent the healers can be trusted to give correct information of the plants they use. There is, of course, no absolutely reliable way of checking this, but the following evidence indicates that most of the healers probably gave a true account of the plants they used: (1) we obtained a considerable number of duplicates, i.e. the same plants were shown to us by several healers; (2) most of the plants collected have been reported in the literature to have been used as medicinal plants.

The following list enumerates the plants identified from the two expeditions in alphabetical order, with respect to families and to genus within the families. In a few cases definitive determination was impossible because of insufficient material — this is indicated by "cfr." in front of the relevant name. When one collection out of two or more of the same species was insufficient for safe determination, the collection number is given in parentheses. The following abbreviations are used:

Syn: synonyms.

TMP: (followed by number): collection number (TMP = Tanzania Medicinal plants). Parentheses around the TMP number indicates that the botanical identification is not definitive.

V: vernacular name. The vernacular names are those given by the healers and, unless otherwise stated, they are in the language of the district where the plants were collected. These languages are: Handeni district, Zigua; Lushoto district, Sambia (Shambaa); Korogwe district, Sambia; Same district, Pare; Tanga district, Digo and Swahili. Vernacular names within parentheses relate to TMP specimens for which the botanical identification is not definitive.

L: locality.

H: habitus.

D: approximate distribution.

Med: plant part used, preparation of remedy and medicinal use. In some cases the healers mixed parts from several different plants when preparing the remedy. These plants are noted by their vernacular names. The corresponding botanical name is given only when a TMP

specimen could be collected and identified. Parentheses around the description of the medicinal use relates to TMP specimens for which the botanical identification is not definitive.

Lit: literature.

U: reported use.

C: reported constituents.

P: reported pharmacological effects.

The following frequently cited references will be referred to by abbreviated citations as follows: Haerdi = Haerdi (1964); Kerharo = Kerharo and Adam (1974); Kokwaro = Kokwaro (1976); Watt = Watt and Breyer-Brandwijk (1962).

ACANTHACEAE

Achatoda englerana (Lindau) C.B. Cl. Syn: *Justicia englerana* Lindau. TMP: 185, 284. V: Tugutu. L: Lushoto district, Mayo village. H: Herb. D: E. and E.S. tropical Africa. Med: Decoction of roots mixed with an egg yolk drunk against nausea and to treat swollen liver and spleen. Lit: U: *Roots*: Laxative (Kokwaro). Laxative and tuberculosis remedy (Watt). *Leaves*: Laxative, emetic, to remove pain in childbirth (Watt).

AMARANTHACEAE

Achyranthes aspera L. TMP: 103. V: Kiandama. L: Korogwe district, Kwasemangube village. H: Herb. D: Throughout Africa. Med: Decoction of roots drunk against diseases of the spleen and stomach-ache. Lit: U: *Roots*: For treatment of rheumatism and, applied externally, against pneumonia (Haerdi). For treatment of venereal diseases, to cure stitch, and as a laxative. Applied externally on wounds to stop bleeding (Kokwaro). For relief of stitch, as a digestive and stomachic, as a remedy for piles, as a diuretic, as an emetic. Externally to stop bleeding of wounds (Watt). *Leaves*: Dry, powdered leaves to treat ankle sprains. As a remedy for headache (Kokwaro). As a remedy for boils and abscesses, as an emetic (Watt). Against diarrhoea, externally to heal wounds after circumcision, to hasten the maturing of abscesses and to extract thorns from the feet (Raponda-Walker and Sillans, 1961). *Entire plant or aerial parts*: Externally in artificial wounds for treatment of pneumonia (Haerdi). Boiled and the fumes inhaled for treatment of colds. Also used in hot baths for the same purpose. For making snuff, as a digestive and stomachic, as a remedy for piles and as a diuretic. For treatment of renal dropsy and bronchial infections. Applied locally to bites of insects, scorpions and snakes. The juice of the plant is used to dissipate opacity of the cornea and to relieve toothache and dysentery (Watt). As a diuretic (Kerharo). *Seeds*: To treat snake bites, hydrophobia

and itching, as an emetic and for application to inflamed and enlarged glands (Watt). C: The roots contain a glycoside fraction with oleanolic acid as the aglycone (Khastgir and Sen Gupta, 1958). Oleanolic acid is also the aglycone of a saponin isolated from the seeds and containing glucose, galactose, xylose and rhamnose in the sugar moiety (Gropalchari and Dhar, 1958; Khastgir *et al.*, 1958). The aerial parts of the plant contain achyranthine, which is the betaine of *N*-methylpyrrolidine-3-carboxylic acid (Basu, 1957) and 0.01% of a CHCl_3 -soluble basic fraction (Kapoor and Singh, 1967). P: Extracts of the plant have antidiabetic activity and are effective against lepra (Kerharo). The CHCl_3 -soluble basic fraction (Kapoor and Singh, 1967) has a transient hypertensive activity, a positive inotropic effect, a transient stimulating effect on respiration and is spasmolytic on smooth muscle (Kapoor and Singh, 1967). The saponin fraction of the seeds has a positive inotropic effect and increases the activity of phosphorylase A in the heart of the rat (Gupta *et al.*, 1972, Ram *et al.*, 1971). Achyranthine has a hypotensive effect and is negatively inotropic; it dilates blood vessels and increases the rate and amplitude of respiration. A spasmogenic effect on frog's rectus muscle and diuretic and purgative effects in albino rats were also observed (Neogi *et al.*, 1970). A benzene extract of the plant has a 100% abortifacient activity in the rabbit at a dose of 50 mg/kg body weight (Pakrashi and Bhattacharya, 1977).

ANACARDIACEAE

Ozoroa insignis Del. subsp. *reticulata* (Bak.f.) Gillett. Syn: *Heeria insignis* sensu Stedman 1933, *H. insignis* var. *reticulata* Bak.f., *H. pulcherrima* sensu Eyles 1916, *H. reticulata* (Bak.f.) Engl., *Ozoroa reticulata* (Bak.f.) R. & A. Fernandes. TMP: 208. V: Muhombe. L: Handeni district, Misima village. H: Tree. D: E. and S. tropical Africa. Med: Decoction of root drunk against bilharzia. Lit: U: *Roots*: For treatment of malaria and as aphrodisiac (Haerdi). As a galactagogue and an aphrodisiac (Watt). *Stem bark*: To treat diarrhoea and stomach pains (Kokwaro). To treat dysentery and as a remedy for "pink eye" (Watt).

Rhus natalensis Bernh. ex Krauss. Syn: *Rhus glaucescens* A. Rich., *R. incana* Mill. var. *dahomensis* Hutch. & Dalz., *Searsia natalensis* (Bernh. ex Krauss.) Barkl. TMP: 28. V: Mkumbambogo. L: Tanga district, Tongoni Village. H: Shrub. D: Throughout tropical Africa. Med: Decoction of root drunk to "drive out the devil". Lit: U: *Roots*: Laxative, aborticide, antimalarial (Haerdi). For treatment of influenza, abdominal pains, gonorrhoea and hookworm (Kokwaro). Against gonorrhoea, influenza, habitual abortion, repeated still-births, fits in children and for treatment of wounds (Watt). *Leaves*: Laxative, aborticide (Haerdi). To cure colds and for treatment of cough and stomach pains (Kokwaro). For treatment of gonorrhoea, wet dermatosis and furunculosis (Watt). *Fruits*: For treatment of stomach disorders (Watt).

Rhus vulgaris Meikle. Syn: *Rhus incana* Brenan, p.p., *R. villosa sensu* Oliv. p.p. TMP: 274. V: Mbungulu. L: Same district, Suji village. H: Tree. D: Tropical Africa. Med: Decoction of roots against painful menstruation.

Sorindeia madagascariensis DC. Syn: *Sorindeia obtusifoliolata* Engl. TMP: 184. V: Mkunguma. L: Lushoto district, Mayo village. H: Tree. D: E. and E. S. tropical Africa, Madagascar, the Mascarenes. Med: Decoction of roots mixed with roots from Mwinu (*Cassia didymobotrya* Fres., TMP 182), Mkumba (*Macaranga capensis* (Baill.) Sim, TMP 123) and Mshegheshe (*Myrica salicifolia* Hochst ex A. Rich., TMP 178) drunk against mental illness. Lit: U: *Roots*: Against malaria, hookworm and hemorrhoids (Haerdi). For menstruation problems (Kokwaro). *Stem bark*: Externally for treatment of syphilitic sores (Haerdi).

ANNONACEAE

Annona senegalensis Pers. subsp. *senegalensis*. Syn: *Annona chrysophylla* Boj., *A. chrysophylla* Boj. var. *porpetac* (Baill.) Robyns & Ghesq., *A. porpetac* Baill., *A. senegalensis* Pers. var. *porpetac* (Baill.) Diels, *A. senegalensis* Pers. var. *chrysophylla* (Boj.) Sillans, *A. senegalensis* Pers. var. *latifolia* Oliv. TMP: 22, 48, 66, 71, 78. V: Mbokwe, Mtopetope. L: Tanga district, Mpirani, Lumbwa, Pongwe, Pongweni villages. H: Tree. D: Tropical Africa. Med: Decoction of roots and leaves drunk against abdominal pain (due to muscle contraction); paste of roots ground with water applied on snake bites and on abscesses and wounds; decoction of roots mixed with roots of Mbono and male pawpaw tree drunk against Kisonono (gonorrhoea?). Lit: U: *Roots*: Expectorant and, externally, for treatment of tumors (Haerdi). To treat colds (Kokwaro). As a homicidal poison, to treat sterility in women, boiled with sodium carbonate to treat venereal diseases and gastrointestinal complaints, for treatment of sleeping sickness, against diarrhoea, to wean a child from its mother's breast, externally for treatment of snake bites (Watt). Febrifuge, antitussive, diuretic, anti-infectant, wound-healer. Also used against diseases of the respiratory organs, eyes and ears as well as to treat dermatoses, ulcer, rheumatism, blenorhagia and other diseases (Kerharo). For treatment of diarrhoea (Sandberg, 1965). *Leaves*: To treat diarrhoea (Haerdi). Against snake bite, as an eye-lotion, for treatment of guinea worm, as a remedy for chest conditions (Watt). Kerharo lists the same use for the leaves as for the roots. *Stem bark*: For treatment of buboes and snake bite, as an emetic and for homicidal purpose, for stomach-ache, for skin eruptions, as a mouth-wash against toothache (Watt). Anti-diarrhoicum, antidysentericum, against sterility in women and to produce lactation (Kerharo). C: The bark gives positive tests for alkaloids, tannin and saponins. The leaves contain rutine, quercitrine and quercetine (Kerharo). The plant contains a glycoside and a cyanogenetic resin. The bark contains 0.02% anonaine and 0.14% of another alkaloid (Watt).

cfr. *Artabotrys hexapetalus** (L.f.) Bhandari. Syn: *Artabotrys odoratissimus* R.Br., *A. uncinatus* (Lam.) Merrill. TMP: 127. V: Mwangatini. L: Korogwe district, Kerenge village. H: Shrub. D: Cultivated. Med: Decoction of roots and leaves mixed with roots of Mshofu. (*Uvaria* cfr. *leptocladon* Oliv., TMP 115) against abdomen and kidney pain. Lit: C: Two unsaturated sesquiterpenes — yingzhaosu A and B — have been isolated from the roots (Liang *et al.*, 1979a, 1979b).

Monanthotaxis fornicata (Baill.) Verdc. Syn: *Clathrospermum biovulatum* S. Moore, *Enneastemon fornicatus* (Baill.) Exell, *Popowia fornicata* Baill. TMP: 23. V: Mchofu. L: Tanga district, Tongoni village. H: Shrub. D: East Africa. Med: Outer root bark scraped off and burnt and smoke inhaled against mental diseases; decoction of roots boiled with roots of Mtonga, Mwuje (cfr. *Cedrela odorata* L., TMP 156), Mkwnazi and garlic, onions and elephant dung, drunk for the same purpose. Lit: U: The powdered leaf is used as a snake-bite remedy (Watt).

Uvaria acuminata Oliv. Syn: *Uvaria holstii* Engl., *U. leptocladon* Oliv. var. *holstii* (Engl.) Engl. & Diels. TMP: 9, 18, 89. V: Mungwene, Mngwene, Msalansi. L: Tanga district, Mpirani and Kiromoni villages. H: Shrub. D: E. Africa to Madagascar. Med: Decoction of roots against mental diseases. A decoction of the roots mixed with roots of Msienene is drunk to treat convulsions in children. The treatment also includes bathing the child with a mixture of the mother's urine and crushed leaves of Kifumbasi (*Hyptis suaveolens* Poit., TMP 91) as well as letting the child inhale the smoke from a burning mixture of elephant dung, chicken feathers and leaves of Kifumbasi. Lit: U: A decoction of the root is used against painful menstruations, dysentery, snake bite and pectoral diseases (Kokwaro). C: Uvaretin, which has an inhibitory activity in a lymphocytic leukemia test, has been isolated from the plant and its structure determined (Cole *et al.*, 1976).

Uvaria cfr. *leptocladon* Oliv. TMP: 115. V: Mshofu. L: Tanga district, Kwasemangube village. H: Shrub. D: E. Africa. Med: Decoction of roots mixed with roots from Mshashu (*Conyza pyrrhopappa* A. Rich. subsp. *longifolia* (O. Hoffm.) Wild, TMP 116), Mgusapungu and Mlenga drunk against attacks, similar to epilepsy, in children. Lit: U: *Roots*: Against malaria and as aphrodisiac (Haerdi). For relief of epilepsy, for lunacy and possession by spirits, for sunstroke and tonsillitis (Watt). *Leaves*: Externally against malaria (Haerdi). A decoction of the leaves and young twigs mixed with *Senecio* sp. is used for relief of epilepsy (Watt). *Stem bark*: Against malaria (Haerdi).

Uvaria lucida Benth. subsp. *lucida*. Syn: *Uvaria dielsii* R.E. Fries, *U. fruticosa* Engl. TMP: 62, (80). V: Mbwene, (Mngwene). L: Tanga district, Maranzara and Pongweni villages. H: Tree or shrub. D: E. Africa. Med: Decoction of

roots boiled with coconut as purgative against constipation and to relieve stomach pain; decoction of roots mixed with roots from Mwinikanguu against mental disease; leaves mixed with leaves of Mvuma-Mke (*Premna chrysoclada* (Boj.) Gürke, TMP 64), Mwinikanguu and Mchelele soaked in cold water and the extract used for bathing the patient against mental disease. Lit: U: Decoction of roots and juice of leaves drunk against hookworm (Haerdi).

APOCYNACEAE

Diplorhynchus condylocarpon (Müll. Arg.) Pichon. Syn: *Diplorhynchus angolensis* Büttner, *D. angustifolia* Stapf, *D. condylocarpon* subsp. *angolensis* (Büttner) Duvign., *D. condylocarpon* subsp. *mossambicensis* var. *psilopus* (Welw.) Duvign., *D. mossambicensis* Bth., *D. psilopus* Welw., *D. welwitschii* Rolfe. TMP: 266. V: Mtogo. L: Handeni district, Segera-Michungwani village. H: Tree. D: Tropical and S. Africa. Med: Powdered stem bark (fresh or dry) mixed with porridge against rectal prolapse. Extract of stem bark prepared with cold water is used to treat "fluidy semen" and "light blood". Lit: U: *Roots*: A decoction of the root is used for gonorrhoea, as a vermifuge, against bilharzia and as a spasmolytic for treatment of colic. Externally, together with a bark extract, for treatment of hydrocele (Haerdi). For treatment of gonorrhoea, testicle inflammation, dysentery, snake bites, sore eyes and to facilitate child's birth (Kokwaro). For treatment of blackwater fever, as a remedy for stomach complaints, haematuria, syphilis and as a cough remedy (Watt). *Leaves*: As a headache remedy (externally) and to treat indigestion, haematuria and syphilis (Watt). *Fruits*: The vapour from the fruit, boiling in water, is used as a cough remedy (Watt). *Entire aerial parts*: As a snake-bite remedy and as an emetic (Watt). *Latex*: As a lactagogue (Haerdi). C: The root bark contains the alkaloids yohimbine, β -yohimbine, tombozine (= normacusine B), stemmadenine, condylocarpine, norfluorocurarine and mossamine (Stauffer, 1961; Goutarel *et al.*, 1961; Monseur *et al.*, 1962). P: Tombozine is sympatholytic and ganglionic blocking with a hypotensive activity greater than that of reserpine. Tombozine causes depression of conditioned reflex activity and, in combination with akuammicine, an increase of the blood sugar level. Local anaesthetic activity is also reported (Quevauviller and Takenaka, 1962; Sultanov and Saidkasymov, 1965; Nasirov *et al.* 1966; Sadritinov *et al.*, 1967; Sultanov and Saidkasymov, 1971; Akhmedkhodzhaeva *et al.*, 1971; Sultanov, 1971). Stemmadenine has very little effect on arterial blood pressure but increases the hypertensive effect of adrenaline and the vasoconstriction caused by this drug (Raymond-Hamet, 1960). A patent for a total extract of the bark, useful as a sympatholytic drug, has been filed (Raymond-Hamet, 1968).

Voacanga africana Stapf. Syn: *Voacanga lutescens* Stapf, *V. boehmii* K. Schum. p.p. TMP: 283. V: Mberebere (Sambaa and Pare). L: Same district,

*The taxonomy of this genus is insufficiently known.

Kisiwani village. H: Tree. D: Tropical Africa. Med: Fruits with seeds are extracted with cold water for 7 days and the extract used against "internal sores" (cancer?). Roots (outer dirty bark removed) are dried, powdered and sieved. The powder is mixed with soft porridge and used against kidney trouble, abnormally frequent menstruations, and too frequent urinating in men. Smoking is not allowed during treatment. Lit: U: *Roots*: Decoction drunk against dysmenorrhoea and for treatment of spasms of the heart (angina pectoris?) (Haerdi). *Stem bark*: Decoction used for treatment of spasms of the heart (angina pectoris?) (Haerdi). C: *Root bark and stem bark*: These parts contain a great number of indole alkaloids. The total alkaloid content is 9.2% in the root bark and 3.9% in the stem bark (Percheron, 1959). The main alkaloids are the same in the two types of bark. The following alkaloids have been isolated and their structure determined: coronaridine, decarbomethoxyvoacamine, 3-epi- α -yohimbine, ibogaine, ibogamine, iboluteine, iboxygaine, N-oxyvoacamine, perakine, pseudo-yohimbine, reserpine, voacafrine, voacafricine, voacamine, voacamidine, voacaminine, voacangine, voacangine hydroxyindolenine, voacangine lactam, voacordine, voacristine, voacryptine, voabasine, vobtusine and β -yohimbine (Budziekiewicz *et al.*, 1963; Janot and Goutarel, 1955a, 1955b; Percheron, 1959; Pusieux *et al.*, 1967; Rao, 1958; Renner 1957, 1959; Renner and Prins, 1959, 1961; Renner *et al.*, 1963; Stauffacher and Seebeck, 1958; Thomas and Biemann, 1968a, 1968b). The main alkaloids of the stem bark are: voacamine, voacangine, voacordine, voacristine and vobasine (Thomas and Biemann, 1968a). *Leaves*: Besides voacamine and vobtusine, which also occur in stem bark and root bark, the leaves contain the following alkaloids: desoxyvobtusine lactone, folicangine, isovoafoline, voafoline, voafolidine, voaphylline, voaphylline-diol, voaphylline hydroxyindolenine, vobtusine lactone (Kunesch *et al.*, 1967a, 1967b, 1968a, 1968b, 1970, 1971; Rolland *et al.*, 1976). The total alkaloid content is 0.2% with voaphylline as the main alkaloid (0.026%) (Kunesch *et al.*, 1968a). *Seeds*: The seeds contain tabersonine (Kunesch *et al.*, 1968a). P: The total alkaloids from root bark or stem bark have a ventricular stimulating effect with direct action on the myocardium. They are also hypotensive and have weak sympatholytic and parasympatholytic activities (Quevauviller *et al.*, 1955). The total alkaloids from the root bark have marked neuroplegic activities. The acute and chronic toxicity is low (Vogel and Uebel, 1961). Voacamine and voacordine are cardiotonics. Voacamine has a positive inotropic effect, but no negative chronotropic effect. It is hypotensive and has parasympathomimetic and sympatholytic effects. Voacordin has a positive inotropic and a negative chronotropic effect. It is hypertensive and has parasympatholytic and sympatholytic properties. Both alkaloids depress the central nervous system. They are 0.01–0.005 times as toxic as Digitalis glycosides (Quevauviller and Blanpin, 1957a, 1957b). Voacangine and voacristine have negative chronotropic effects (Zetler *et al.*, 1968). Voacangine and, to a lesser extent, voacristine antagonize the positive chronotropic and inotropic effects of noradrenaline on the isolated guinea-pig atrium in a non-functional way, but

not as β -adrenergic blocking drugs (Zetler and Singbartl, 1970). Voacangine is hypotensive but has no ganglioplegic, anticholinesterase, parasympatholytic or antihistaminic action. It also shows a central depressant activity (Blanpin *et al.*, 1961). Voacangine and voacristine are not tremorigenic when injected intracerebrally in mice (Singbartl *et al.*, 1973). The central effect of voacangine, voacamine, voacamidine, voacordine and ibogaine have been studied (Zetler and Unna, 1959). The structure-activity relationship in the cytotoxicity of voacamine, voacamidine, voacangine and vobasine was studied by Kingston (1978).

ASCLEPIADACEAE

cfr. *Parquetina nigrescens* (Afz.) Bullock. Syn: *Omphalogonus calophyllus* Baill., *O. nigricans* N. E. Br., *Parquetina gabonica* Baill., *Periploca afzelii* G. Don, *P. calophylla* (Baill.) Roberty, *P. gabonica* (Baill.) A. Chev., *P. nigrescens* Afz., *P. nigricans* Schltr., *P. preussii* K. Schum., *P. wildemanii* A. Chev. TMP: 149. V: Sikombe (Makonde). L: Korogwe district, Kijango village. H: Vine. D: Tropical Africa. Med: The herb is used against dysmenorrhoea. Lit: U: Decoction of roots used as aphrodisiac (Kokwaro). Fresh bark mixed with bark of *Strophantus gratus* is used for preparation of arrow poison (Bouquet, 1969). The whole plant is used for the same purpose (Sandberg, 1965). C: The leaves and stem bark have given negative tests for alkaloids, flavonoids, saponins, tannins, quinones, steroids and terpenes (Bouquet, 1972). The wood contains a complicated mixture of cardiac glycosides with strophanthidin, 16 β -hydroxystrophanthidin, 16 β -acetoxystrophanthidin, 16-dehydrostrophanthidin, strophanthidol, 16-dehydrostrophanthidol and convallatoxin as aglycones (Berthold *et al.*, 1965a, 1965b; Mauli and Tamm, 1957; Schenker *et al.*, 1954).

BERBERIDACEAE

Berberis holstii Engl. Syn: *Berberis aristata* DC. var. *subintegra* Engl., *B. grantii* Ahrendt, *B. petitiiana* Schneid. TMP: 168. V: Mlash'o (Kilasho). L: Lushoto district, Mambo village. H: Shrub. D: Somalia Rep. (N.) to Malawi and Zambia. Med: Decoction of roots against jaundice. Lit: U: Powdered root bark applied externally to heal wounds. Decoction of root drunk for stomach troubles (Kokwaro).

BIGNONIACEAE

Kigelia africana (Lam.) Benth. Syn: *Bignonia africana* Lam., *Crescentia pinnata* Jacq., *Kigelia abyssinica* A. Rich., *K. aculifolia* Engl. ex Sprague, *K. aethiopica* Decne., *K. aethiopica* Decne. var. *abyssinica* (A. Rich.) Sprague, *K. aethiopica* Decne. var. *bornuensis* Sprague, *K. aethiopica* Decne. var. *usambarica* Sprague, *K. aethiopium* (Fenzl) Dandy, *K. elliotii* Sprague, *K. elliptica* Sprague, *K. impressa* Sprague, *K. lanceolata* Sprague, *K. moosa*

Sprague, *K. pinnata* (Jacq.) DC., *K. spragueana* Wernham, *K. talbotii* Hutch. & Dalz., *Sotor aethiopium* Fenzl. TMP: 52, (134), (136), 141. V: Mwegea, (Mnkande), (Mvugwe), Mvungunya, Mvungwe. L: Tanga district, Tongoni village. Korogwe district, Mombo village. H: Tree. D: Tropical Africa. Med: Stem bark and leaves boiled with meat are used against a condition called "Kambaku", the symptoms of which resemble sinusitis. A decoction of the bark is drunk to treat male sterility. It is also considered as an aphrodisiac. [A decoction of a mixture of the root, the stem bark and the root of *Mnama* (*Combretum collinum* Fresen, TMP 135) is used for treatment of excessive menstrual bleeding.] Lit: U: *Roots*: A decoction of the roots is drunk in connection with treatment of wounds by preparations of the bark (see below) (Haerdi). For treatment of sterility in combination with roots of different *Ficus* spp. (Kerharo). For treatment of gynecological conditions and as a remedy for boils and sore throat (Watt). *Stem bark*: Externally for wound-healing (Haerdi). To cure headache (Kokwaro). Mixed with stem bark of *Mitragyna inermis*, roots of *Fagara xantoxylodes* and seeds of *Sterculia setigera* for treatment of epileptic conditions (Kerharo). For treatment of wounds, ulcers and abscesses. As a remedy for syphilis and gonorrhoea. For rheumatism and dysentery (Watt). As an expectorant and cough remedy (Sandberg, 1965). *Leaves*: To cure malaria (Kokwaro). *Fruits*: Beer made with the fruit is used for bathing children against measles (Kokwaro). As an intoxicant and sexual stimulant. For treatment of haemorrhoids. Externally on a woman's breasts to produce lactation. For treatment of gynecological conditions (Watt). The unripe fruit is poisonous and is used externally for treatment of syphilis and rheumatism. (Watt). *Seeds*: Roasted seeds mixed with beer cause the sexual organs to enlarge (Kokwaro).

Markhamia obtusifolia (Bak.) Sprague. Syn: *Dolichandrone obtusifolia* Bak., *Markhamia lanata* K. Schum., *M. paucifoliolata* De Wild., *M. verdickii* De Wild. TMP: 159, 164A. V: Muyuyu (Makonde). L: Korogwe district, Kijango (Kienyeni) village. H: Shrub. D: Tropical Africa. Med: Powdered root wood (no bark) is macerated with cold water and filtered. A piece of burning charcoal is added to the filtrate which is drunk against tachycardia. Lit: U: *Roots*: A decoction of the roots is used against scrofula, hookworm, as a cough remedy and for treatment of snake bites (Haerdi). Roots boiled with water together with stem bark and leaves as well as other plants is used as an inhalant. Chewed roots to treat convulsions in children (Kokwaro). *Leaves*: For treatment of snake bites (Haerdi, Kokwaro). *Aerial parts of the plant*: To cure stomach troubles (Kokwaro).

BOMBACACEAE

Adansonia digitata L. Syn: *Adansonia sphaerocarpa* A. Chev. TMP: 130. V: Mbuyu. L: Korogwe district, Mombo village. H: Tree. D: Hotter and drier parts of tropical and subtropical Africa, Madagascar, India. Med: A

decoction of the stem bark also containing stem bark of Moza (*Sterculia* cfr. *stenocarpa* H. Winkler, TMP 133) and Mfume (*Sterculia* cfr. *appendiculata* K. Schum., TMP 137) as well as plant debris left behind by floods ("Shiizi") is used for treatment of a gynecological complaint called Chashi, the symptom of which is more or less pronounced vaginal bleeding. Lit: U: *Roots*: Decoction as a remedy for lassitude (Kokwaro). *Stem bark*: Powder, mixed with porridge for treatment of malaria. Decoction to rinse the mouth against toothache (Haerdi). Decoction drunk to cure pains in the body and for bathing infants if they are weak. In steam baths for high fever and as a diaphoretic (Kokwaro). As a febrifuge and as antidote to *Strophanthus* poisoning (Watt). Against menorrhagia, anaemia, rachitis and as a tonic and a febrifuge (Kerharo). *Leaves*: As a diaphoretic, expectorant, astringent and a prophylactic against fevers. Also to check excessive perspiration (Watt). Against diarrhoea, fever and inflammations and externally against filaria (Kerharo). As anthelmintic, antiasthmatic, febrifuge, diuretic and for treatment of eyes and ears (Pernet, 1957). *Fruits and seeds*: As a dysentery remedy. The fruit pulp to cure fevers, hemoptysis and diarrhoea (Watt). A decoction of the fibers of the fruit is used as an emmenagogue. The seeds and fruit pulp to cure intestinal inflammations and dysentery (Kerharo). C: The stem bark contains adansonin which has a cardiotonic activity (Watt). The leaves contain adansonia flavonoside (Kerharo). All organs of the tree contain mucilage, rich in uronic acids (Kerharo). P: An extract of the leaves has a hypotensive activity when injected intravenously in dogs. It also prevents asthmatic attacks induced by histamine in guinea pigs (Vincent *et al.*, 1946). A tincture of the leaves produces hypotension, bradycardia and polypnea in the dog, but has no appreciable effect on histamine-induced asthma in guinea pigs. Adansonia flavonoside decreases the capillary permeability in the rabbit, but is less active than rutine (Paris and Moyse-Mignon, 1951). Extracts of the bark have proved ineffective against malaria (Watt).

BORAGINACEAE

Cordia ovalis R. Br. Syn: *Cordia bequaertii* De Wild., *C. kabarensis* De Wild., *C. mixa* Hochst. ex A. Rich. p.p, non Linn., *C. rubra* Hochst. ex A. Rich. TMP: 207. V: Mshasha. L: Handeni district, Magarimabovu village. H: Tree. D: Tropical Africa. Med: Decoction of root against leprosy. Lit: U: *Roots*: The pounded roots are used as a poultice for wounds with pus (Kokwaro). *Leaves*: For eye-ache. Externally as a steam bath and for washing in the treatment of leprosy. The cure also involves rubbing in a paste of the pounded bark (Kokwaro). Watt records exactly the same treatment for leprosy.

Ehretia amoena Klotzsch. Syn: *Ehretia mossambicensis* Klotzsch. TMP: 160, (118), 203. V: Nkatakata (Makonde), (Mvungulwiza). L: Korogwe district, Kijango (Kienyeni) and Semangube villages. H: Tree. D: E. and S. Africa.

Med: Dry stem bark ground and mixed with perfumed oil, e.g. "Moono" or "Hongera", a little cold water added and warm mixture used against skin diseases, e.g. fungus infection; (decoction of roots in combination with roots of Msimisi, Mnyangaanyangaa, and Mhungulu used as a remedy for miscarriage). Decoction of roots against diarrhoea and abdominal pain. Lit: U: *Roots*: Decoction of roots for treatment of gonorrhoea (Kokwaro). *Leaves*: For treatment of wounds. Mixed with bark and fruits, the mixture pounded and the resulting juice drunk for painful menstruation (Kokwaro).

Trichodesma zeylanicum (L.) R. Br. Syn: *Boraginella zeylanica* O. Kuntze, *Boraginoides zeylanica* Hiern, *Borago zeylanica* Burm., *Pollicia zeylanica* F. Muell., *Trichodesma kotschyannum* Fenzl ex A. DC. TMP: 150. V: Ligalu (Makonde). L: Korogwe district, Kijango village. H: Herb. D: Tropical Africa, S. Asia and Australia. Med: The herb is burnt and the ash used against coughing due to enlarged uvula. Lit: U: *Roots*: A decoction is used as a diuretic and against rheumatoid arthritis (Kokwaro). Chewed roots or a cold water extract as an antidote for snake bite. Also externally on the bite. A decoction is used against tuberculosis (Kokwaro). Powdered or chewed roots are applied to wounds (Watt). *Leaves*: As an emollient poultice and to produce diuresis (Watt). *Entire aerial parts*: Plant parts are pounded, boiled slightly and applied to abscesses. Plant parts are pounded with water and the juice drunk to treat a kind of dry eczema. The juice is also applied externally (Haerdi). C: The seeds contain 1% of the pyrrolizidine alkaloid supinine (O'Kelly and Sargeant, 1961).

BURSERACEAE

Commiphora cfr. *africana* (A. Rich.) Engl. Syn: *Balsamea pilosa* Engl., *Balsamodendrum africanum* (A. Rich.) Arn., *Commiphora calcicola* Engl., *C. nkolola* Engl., *C. pilosa* (Engl.) Engl., *C. rubriflora* Engl., *C. sambesiaca* Engl., *Heudelotia africana* A. Rich. TMP: 73. V: Mbambara. L: Tanga district, Pongwe village. H: Tree. D: Tropical Africa, the Transvaal and S. W. Africa. Med: Against stomach problems. Lit: U: *Roots*: Hot decoction used externally to treat a stiff neck (Haerdi). Decoction drunk for treatment of swollen testicles and stomach troubles. In steam baths together with the stem bark for treatment of colds and fevers (Kokwaro). For treatment of colic, lepra and syphilis (Kerharo). *Stem bark*: Powdered stem bark is mixed with porridge and eaten to cure malaria (Haerdi). For treatment of colic, lepra and syphilis (Kerharo). The bark is chewed with tobacco and applied on a snake bite (Kokwaro). The washed bark mixed with salt is applied on a snake bite (Watt). *Fruits*: For treatment of typhoid (Kokwaro). As a remedy for stomach troubles (Watt). *Resinous exudate*: For sealing up and disinfecting wounds (Kokwaro). Applied as a plaster and used for spasms and fevers (Watt). The fumes of the burnt resin are antiseptic and useful against migraine and as an insecticide (Kerharo). C: A preliminary chemical study of the resinous exudate was performed by Jessenne *et al.* (1974). 30 - 60% of the exudate is polyholosides (Kerharo).

Commiphora cfr. *boiviniana* Engl. Syn: *Commiphora holosericea* Engl., *C. scaberula* Engl. TMP: 69. V: Danda chindi. L: Tanga district, Pongwe village. H: Tree. D: E. Africa, Ethiopia. Med: Decoction of roots drunk against gonorrhoea (kisaliali). Lit: U: *Roots*: A decoction is drunk against hydrocele (Haerdi). *Stem bark*: Warm stem bark is rubbed on the breasts to produce lactation and a decoction is drunk for the same purpose. A decoction is drunk as an aphrodisiac (Haerdi). Powdered stem bark mixed with millet meal is eaten to cure dysentery (Kokwaro). Also Watt reports the bark as a dysentery remedy. *Fruit*: Decoction as a remedy for indigestion (Kokwaro). The juice of the berry is used as a fish poison and an arrow poison (Watt).

Commiphora madagascariensis Jacq. Syn: *Balsamea abyssinica* (Berg) Engl., *Balsamodendron habessinica* Berg, *Commiphora habessinica* (Berg) Engl., *C. lindensis* Engl., *C. subsessilifolia* Engl. TMP: 215. V: Mtonto. L: Handeni district, Misima village. H: Tree. D: Tropical Africa, Yemen. Med: Extract of roots in cold water against abdominal pain and excessive menstruation. Lit: U: *Fruits*: Against fever (Kokwaro). *Latex*: For treatment of toothache (Kokwaro). C: The resin contains a volatile oil with cuminol and eugenol (Watt).

Commiphora pteleifolia Engl. TMP: 226. V: Danandasindi. L: Handeni district, Misima village. H: Tree. D: N. Rhodesia, Tanzania. Med: Decoction of roots boiled with roots of Mvungaliza and egg drunk against "swollen internal parts of a woman" (Kuvimba kinena kwa ndani), i.e. cervical cancer? (making it painful or impossible to have intercourse). Lit: U: *Roots*: decoction drunk for headache (Kokwaro).

Commiphora zimmermanii Engl. Syn: *Commiphora kymbilensis* Engl., *C. missionis* Chiov., *C. puguensis* Engl. TMP: 145, 280. V: Mnyakun, Idondo, Isume. L: Korogwe district, Mombo village, Same district, Hekano village. H: Tree. D: E. Africa. Med: Branches cut into pieces and soaked in cold water. The extract drunk against excessive bleeding during menstruation or after birth. Lit: U: *Roots*: For snake bite treatment. Decoction drunk for constipation (Kokwaro). The root is an indigestion remedy. A decoction of the root, or the root boiled with butter is used as a fever remedy (Watt). *Leaves*: A cold-water extract is drunk against fever. Leaf stalks are heated in the fire and chewed against toothache (Kokwaro). A cold-water infusion of the leaves is used as a fever remedy. The leaf stalk is used as a toothache remedy (Watt). *Stem bark*: A decoction is used for constipation. The bark, cooked with meat, is used against indigestion, abdominal pain and stomachache. The bark can also be chewed and the juice swallowed (Kokwaro).

CAESALPINIACEAE

Cassia abbreviata Oliv. subsp. *beareana* (Holmes) Brenan. Syn: *Cassia beareana* Holmes. TMP: 163. V: Mwalola (Makonde). L: Korogwe district,

44
Kijango (Kienyen) village. H: Tree. D: Tropical and S. Africa. Med: A cold-water extract is drunk against bilharzia. Lit: U: *Roots*: Decoction of the roots used as a malaria remedy, vermifuge and carminative (Haerdi). The decoction is used against gonorrhoea, pneumonia, chest complaints, uterine complaints, stomach troubles and fever of malaria. The roots are also taken orally for suspected syphilis (Kokwaro). A warmed-up cold infusion of the root is held in the mouth for relief of toothache. A decoction is used for treatment of malaria, blackwater fever, diarrhoea and schistosomiasis. A commercial fluid extract has been marketed for treatment of blackwater fever (Watt). *Stem bark*: Decoction as a malaria remedy (Haerdi). The bark is extracted by boiling with cattle urine and water and the extract used as a purgative (Kokwaro). A decoction is used against diarrhoea and the powdered bark for dressing ulcers (Watt). *Fruits*: Crushed fruits are used as a fish poison (Haerdi). P: The fluid extract of the root is said to be cardio-tonic, diuretic and diaphoretic (Watt).

Cassia afrodistula Brenan var. *afrodistula*. TMP: 34, 82, 94. V: Muumba-Mume, Monzoke (Nyamwezi). L: Tanga district, Tongoni Pongweni and Kiromoni villages. H: Tree or shrub. D: E. Africa. Med: Decoction of roots drunk against hernia (the extract is red and bitter) and to cure body weakness. Lit: U: *Roots*: For treatment of colic (Kokwaro). *Stem bark*: A decoction is used to cure kidney diseases and for pain in the liver (Kokwaro). *Leaves*: For treatment of colic (Kokwaro).

Cassia didymobotrya Fres. Syn: *Cassia nairobiensis* Aggeler & Musser. TMP: 182, 272. V: Mwinu. L: Lushoto district, Mayo village. H: Shrub. D: Tropical Africa. Med: Roots boiled with roots of Mkumba (*Macaranga capensis* (Baill.) Sim., TMP 183), Fuiza (*Momordica calantha* Gilg, TMP 170) and Mhunguma and Mshegeshe (*Myrica salicifolia* Hochst. ex A. Rich., TMP 178), filtered and the filtrate drunk against mental illness (Kichaa). Decoction of roots against frequent abortions. Lit: U: *Roots*: A decoction is used as a purgative, as an emetic, as a cure for malarial fever, headache, excess bile and as an antidote for general poisoning (Kokwaro). A decoction of the root is a strong purgative (Watt). *Stem bark*: An extract is used as a purgative and an emetic (Kokwaro). *Leaves*: A decoction is drunk in cases of gonorrhoea and for backache in women. It is also used to cure stomach troubles and for bathing in the treatment of measles. Mixed with roots in a decoction against malarial fever, headaches and excess bile (Kokwaro). The leaf is very poisonous to cattle and sheep, causing intense inflammation of the intestinal canal. It causes diarrhoea in the rabbit. It is used as a purgative and anti-malarial and as a fish poison. Drastic doses are said to be abortifacient (Watt). C: The leaf and the root contain anthraquinones (Watt).

Cassia cfr. *singueana* Del. Syn: *Cassia goratensis* Fres., *C. goratensis* Fres. var. *flavescens* Bak. f., *C. goratensis* Fres. var. *glabra* Bak. f., *C. singueana* Del. var. *flavescens* (Bak. f.) Brenan, *C. singueana* Del. var. *glabra* (Bak. f.)

45
Brenan, *C. zanzibarensis* Vatke. TMP: 53. V: Mvumba. L: Tanga district, Tongoni village. H: Shrub. D: Tropical Africa except in rain forest regions, the Comoro Islands. Med: The juice from crushed leaves drunk against bronchopneumonia, ("Kichomi"). Lit: U: *Roots*: To treat wounds, gonorrhoea and for general stomach problems. A decoction also containing *Microglossa densiflora* is given to children with convulsions (Kokwaro). The root is used to treat venereal diseases (Watt). *Leaves*: Juice is applied to syphilitic sores which are also treated with powder of the leaves. The juice is drunk against malaria and to treat snake bites (Haerdi). Young leaves are chewed and the sap swallowed to treat stomach-ache, constipation and heartburn (Kokwaro). *Fruits*: The fruit pulp is used as a galactagogue (Watt).

Tamarindus indica L. TMP: 155. V: Mkwedu (Makonde), Mkwaju (Swahili). L: Korogwe district, Kijango village. H: Tree. D: Tropics of the old world. Med: Decoction of roots drunk to stop vomiting. Juice from crushed leaves used to prepare a thin porridge, taken to stop vomiting. Lit: U: *Roots*: A decoction is used to cure pains of the heart. A decoction prepared together with the roots of *Mimosa pigra* L. is drunk against hookworm. A decoction prepared together with the root or stem bark of *Stereospermum kunthianum* Cham. is used against lepra. Also the stem bark can be used in this mixture (Haerdi). Decoction used against cough and fevers (Kokwaro). The root is a component of a leprosy remedy (Watt). *Stem bark*: The decoction is used as a gargle for sore throat (Kokwaro). A powder of the stem bark with the bark of *Piliostigma reticulatum* and the fruits of *Acacia nilotica* is used as a haemostat and to heal wounds (Kerharo). A decoction is used as an anti-asthmatic, against amenorrhoea and as a lotion for wounds and abscesses (Watt). *Leaves*: The juice is an antidiarrhoeic and is also drunk against heart pains. Also for treatment of hookworm as described above for the root (Haerdi). A decoction of the leaves together with the twigs of *Sterculia africana* is used against diarrhoea (Kokwaro). Chewed leaves are applied externally to a snake bite. The leaf is purgative, diaphoretic, emollient and an anthelmintic. The decoction is used against fever and as an antirheumatic. Crushed leaves are applied to wounds and abscesses (Watt). *Fruits*: The fruit is a laxative and is used to treat fever, lepra and syphilis (Kerharo). The fruit pulp is purgative, diaphoretic, emollient and is also used to treat haemorrhoids. The fruit is used externally as a wound-healer (Watt). *Flowers*: As a remedy for jaundice, and externally in eye diseases and on ulcers. Also for treatment of intestinal complaints (Watt). C: The bark contains the alkaloid hordenine (Kerharo).

CAPPARIDACEAE

Boscia salicifolia Oliv. Syn: *Boscia powellii* Sprague & Green, *B. stylosa* Gilg & Bened. TMP: 228. V: Mguruka. L: Handeni district, Misima village. H: Tree. D: Tropical Africa. Med: Leaves burnt to ash with leaves of Mdala and Mnyukampara (cfr. *Maerua triphylla* A. Rich., TMP 231) and put in juice

from pounded roots of Mdala, warmed and drunk as an antidote in poisoning, or against tuberculosis. Lit: U: *Roots*: A decoction of root and stem bark is drunk as an aphrodisiac. Decoction drunk to treat severe abscess, scrofula and furuncle (Haerdi). *Leaves*: Pounded leaves are used externally against severe abscess, scrofula and furuncle. Juice for healing wounds (Haerdi). The pounded leaf is administered with water to feverish cattle. Leaf powder to treat inflamed anus (Watt). *Stem bark*: A decoction is used to treat inflammation of the connective tissue of the eye (Haerdi).

Capparis erythrocarpus Isert. Syn: (for species as a whole): *Capparis acuminata* De Wild., *C. acutissima* Gilg & Bened., *C. bequaertii* De Wild., *C. carvalhoana* Gilg, *C. rosea* (Klotsch) Oliv., *C. sulphurea* Gilg & Bened., *Petersia rosea* Klotsch. TMP: 286. V: Msoo (Sambaa), Mvoro. L: Same district, Kisiwani village. H: Liana. D: Tropical Africa. Med: Juice of pounded leaves against child convulsive fever (N.B. Indians use the seeds for the same purpose). Lit: U: *Roots*: Pounded roots applied to severe abscess. Vapours from pounded roots are used to treat inflammation of the connective tissue of the eye (Haerdi).

Maerua angolensis DC. Syn: *Maerua arenicola* sensu Eyles (In *Trans. R. Soc. S. Afr.*, 5, 356), *M. bukobensis* Gilg & Bened., *M. schinzii* sensu O. B. Mill. (in *J. S. Afr. Bot.*, 18, 6), *M. tomentosa* Pax, *Maerua* sp., Eyles l.c. TMP: 216. V: Mlampofu. L: Handeni district, Misima village. H: Tree. D: Tropical and S. Africa. Med: Decoction of roots against abortion. Lit: U: *Roots*: Decoction of roots and stem bark used as aphrodisiac. Decoction of roots drunk to treat severe abscess (Haerdi). Roots used for influenza and toothache (Kokwaro). The root has been used in East Africa for homicidal purposes (Watt). *Leaves*: Juice dropped in fresh wounds for healing. Crushed leaves externally on severe abscesses. Also used as fish poison (Haerdi). Crushed leaves for treatment of lupus. As a purgative (Watt).

cfr. *Maerua triphylla* A. Rich. Syn: (for the species as a whole): *Boscia holstii* Pax, *Maerua calophylla* Gilg, *M. campicola* Gilg & Bened., *M. cylindrocarpa* Gilg & Bened., *M. erythrantha* Gilg & Bened., *M. goetzeana* Gilg, *M. hoehnelii* Gilg & Bened., *M. jasminifolia* Gilg & Bened., *M. johannis* Volk. & Gilg, *M. nervosa* sensu Oliv., *M. pachystigma* Gilg & Bened., *M. pirottiae* Gilg, *M. pubescens* (Klotsch) Gilg, *M. sphaerocarpa* Gilg, *M. stenogyna* Gilg & Bened., *M. ternata* Th. Dur. & Schinz, *M. trachycarpa* Gilg, *M. triphylla* sensu Battiscombe, *M. variifolia* Gilg & Bened., *M. vitisidaefolia* Chiov., *Streblocarpus pubescens* Klotsch. TMP: 231. V: Mnyukampara. L: Handeni district, Misima village. H: Herb. D: Tropical Africa and the Mascarene Islands. Med: Leaves mixed with Mguruka (*Boscia salicifolia* Oliv., TMP 228) are burned and the ash used as antidote against poisons taken. Lit: U: *Roots*: For curing headache, vertigo and as an aphrodisiac. Fresh roots chewed or a decoction drunk for treatment of snake bite (Kokwaro). As a remedy for marasmus and malnutrition (Watt).

CELASTRACEAE

Maytenus heterophylla (Eckl. & Zeyh.) N. Robs. Syn: *Cassine szyszyłowiczii* Kuntze, *Catha buxifolia* (L.) G. Don, *C. cymosa* (Soland.) C. Presl., *C. heterophylla* (Eckl. & Zeyh.) Presl., *Celastrus andongensis* Oliv., *C. angularis* Sond., *C. buxifolius* L., *C. cymosus* Soland., *C. ellipticus* Thunb., *C. empleurifolius* Eckl. & Zeyh., *C. goniecaulis* Eckl. & Zeyh., *C. heterophyllus* Eckl. & Zeyh., *C. humilis* Eckl. & Zeyh., *C. multiflorus* Lam., *C. parvifolius* Eckl. & Zeyh., *C. patens* Eckl. & Zeyh., *C. polyacanthus* sensu Eyles, *C. polyanthemus* Eckl. & Zeyh., *C. rhombifolius* Eckl. & Zeyh., *C. spathephyllus* Eckl. & Zeyh., *C. venenatus* Eckl. & Zeyh. *Elaeodendron glaucum* sensu Szyszyl., *Gymnosporia acanthophora* Loes., *G. angularis* (Sond.) Sim, For. & For., *G. brevipetala* Loes., *G. buxifolia* (L.) Szyszyl., *G. buxifolioides* Loes., *G. capitata* var. *tenuifolia* Loes., *G. condensata* Sprague, *G. crataegiflora* Davison, *G. elliptica* (Thunb.) Schonl., *G. glauca* Loes., *G. heterophylla* (Eckl. & Zeyh.) Loes., *G. maranguensis* (Loes.) Loes., *G. rhombifolia* (Eckl. & Zeyh.) Bolus & Wolley-Dod, *G. senegalensis* var. *maranguensis* Loes., *G. trigyna* sensu Perrier, *G. uniflora* Davison, *G. woodii* Szyszyl, *Maytenus angolensis* Exell & Mendonça, *M. brevipetala* (Loes.) Wilczek, *M. cymosa* (Soland.) Exell. TMP: 147. V: Ndegamau (Makonde), Mjengamanyigu (Swahili). L: Korogwe district, Kijango village. H: Shrub. D: Tropical and S.W. Africa, Madagascar, St. Helena. Med: Leaves used to stop dysmenorrhoea. Lit: U: *Roots*: Decoction drunk against epilepsy and to treat severe abscess (Haerdi). Decoction drunk as an anthelmintic and to cure hernia and syphilis (Kokwaro).

Maytenus putterlickioides (Loes.) Exell & Mendonça. Syn: *Gymnosporia borumensis* Loes., *G. fischeri* var. *magniflora* Loes., *G. fischeri* var. *parviflora* Loes., *G. putterlickioides* Loes., *Maytenus welwitschiana* sensu Brenan 1953. TMP: 211, 234. V: Mtulavuha. L: Handeni district, Misima and Sandeni villages. H: Shrub. D: Tropical and south Africa. Med: Decoction of roots mixed with Mmorwe (*Hoslundia opposita*, Vahl., TMP 213) against irregular menstruation. Decoction of roots mixed with roots of Muhumba against hernia and swollen testicles. Also used as an aphrodisiac and to treat dysmenorrhoea. Lit: U: *Roots*: Roots cooked with soup as a remedy for laziness and internal body injuries. The root is also an aphrodisiac (Kokwaro). As an antiemetic (Watt).

COMBRETACEAE

Combretum collinum Fresen. Syn: *Combretum abercornense* Exell, *C. album* De Wild., *C. angustilanceolatum* Engl., *C. bajonense* Sim, *C. binderanum* Kotschy, *C. brosigianum* Engl. & Diels, *C. burtii* Exell, *C. elaeagnifolium* Oliv., *C. elgonense* Exell, *Combretum* sp. near *C. elgonense* sensu Burt Davy, *C. fisheri* Engl., *C. flaviflorum* Exell, ? *C. frommii* Engl., *C. gazense* Swynn. & Bak. f., *C. goetzenianum* Diels, *C. hypopilinum* Diels, *C. kabadense*

Exell, *C. karaguense* Engl. & Diels, ? *C. kerengense* Diels, *C. kottoense* Exell, *C. laboniense* M. B. Moss, *C. makindense* Engl., *C. mechowianum* O. Hoffm. subsp. *gazense* (Swynn. & Bak. f.) Duvign., *C. mechowianum* O. Hoffm. subsp. *taborensis* (Engl.) Duvign., *C. mwanzense* Exell, ? *C. oliveranum* Engl., *C. populifolium* Engl. & Diels, *C. psammophilum* Engl. & Diels, *C. ritschardii* De Wild. & Exell, *C. singidense* Exell, *C. suluense* Engl. & Diels, *C. taborensis* Engl., ? *C. truncatum* Engl., *C. verticillatum* Engl. TMP: 135, (113), 268. V: Mnama, (Mgunku). L: Korogwe district, Mombo and Semangube villages. H: Tree. D: Tropical and subtropical Africa. Med: Decoction of roots together with roots of Mnkande (cfr. *Kigelia africana* (Lam.) Benth., TMP 134) and bark of Mvugwe (*Kigelia africana* (Lam.) Benth., TMP 136) against excessive menstrual bleeding beyond the normal time. Roots extracted with cold water together with roots of Mlama (*Combretum* cfr. *molle* R. Br. ex D. Don, TMP 121) and Mkwambamaji (cfr. *Phyllanthus reticulatus* Poir., TMP 114), extract boiled and used against diarrhoea accompanied by mild anal bleeding. Powder of stem bark in porridge or tea against rectal prolapse. Lit: U: *Roots*: Decoction of roots and leaves drunk against malaria (Haerdi). Decoction used against dysentery. The root is used to treat snake bite (Kokwaro). The decoction is used for the relief of "Madi", blood illness and pains in the side (Watt). *Leaves*: Vapours of the decoction used against malaria (Haerdi). *Seeds*: The powdered seeds for local application to sore eyes in cattle (Watt).

Combretum exalatum Engl. Syn: *Combretum didymostachys* Engl. & Diels, *C. sennii* Chiov., *C. taitense* Engl. & Diels, *C. tavetense* Diels. TMP: 123, 279. V: Mwelekela. L: Korogwe district, Magoma village. H: Tree. D: E. Africa. Med: Decoction of roots drunk to "drive out the devil". For the same purpose vapours are inhaled from leaves boiled together with leaves of Mkame, Mtalawanda, Mwoza, Mlawa (*Croton polytrichus* Pax, TMP 124), Mwiinukiwa, Mvule (*Ficus* cfr. *vogelii* (Miq.) Miq., TMP 104), Mvungulwiza (cfr. *Ehretia amoena* Klotzsch, TMP 118), Mkombechii (*Croton pseudo-pulchellus* Pax, TMP 125), Mshofu (*Uvaria* cfr. *leptocladon* Oliv., TMP 115) and Ninda. A decoction of a mixture of roots of these plants is also drunk for the same purpose. Infusion of roots against excessive bleeding in menstruation. Lit: U: *Leaves*: Pounded leaves mixed with water externally for rheumatism (Kokwaro).

Combretum cfr. *molle* R. Br. ex D. Don. Syn: *Combretum ankolense* Bagshawe & Bak. f., *C. deserti* Engl., *C. ferrugineum* A. Rich., *C. gondense* F. Hoffm., *C. gueinzii* Sond., *C. gueinzii* Sond. subsp. *splenden* (Engl.) Brenan, *C. holtzii* Diels, *C. hobol* Engl. & Diels, *C. microlepidotum* Engl., *C. nyikae* Engl., *C. nyikae* Engl. var. *boehmii* Engl., *C. petitianum* A. Rich., *C. schelei* Engl., *C. splendens* Engl., *C. splendens* Engl. var. *nyikae* (Engl.) Engl., *C. tenuispicatum* Engl., *C. trichanthum* Fresen., *C. ulugurense* Engl. & Diels, *C. welwitschii* Engl., & Diels. TMP: 121, 244. V: Mlama. L: Semangube village. H: Tree. D: Wooded grassland of tropical and southern

Africa, Yemen. Med: Extract in cold water of roots together with roots of Mgunku (*Combretum* cfr. *collinum* Fresen., TMP 113) and Mkwambamaji (cfr. *Phyllanthus reticulatus* Poir., TMP 114) against diarrhoea (accompanied by mild anal bleeding). Powdered roots in tea against abdominal pain. Lit: U: *Roots*: A decoction of this root and the roots of *Annona chrysophylla* Boj. is used as an expectorant. Decoction also containing roots of *Securinega virosa* (Roxb. ex Willd.) Pax et K. Hoffm., *Psorosperum febrifugum* var. *ferrugineum* Keay & Milne-Redhead, and *Premna* cfr. *senensis* Klotzsch is drunk against syphilis. To treat snake bites a mixture of small chips of this root and roots of *Markhamia obtusifolia* (Baker) Sprague and *Vangueria rotundata* Robyns is applied to the bite. Also wounds from poisoned arrows are treated in the same way (Haerdi). Decoction used for hookworm, stomach pains, snake bite, leprosy, fever, dysentery, general body swellings and as an abortifacient (Kokwaro). Decoction used for swelling of the abdomen and in the treatment of abortion and constipation. The powdered decorticated root is used as a wound dressing (Watt). *Stem bark*: An aqueous suspension is used for gargling and to drink in the treatment of angina (Kerharo). Decoction of the inner bark used for stomach troubles (Watt). *Leaves*: Juice mixed with the decoction of roots to treat abortions and as an antidiarrhoic (Haerdi). An aqueous extract is used to treat chest complaints, as an anthelmintic and as an inhalant in steam baths. Externally, leaves are used together with roots of *Senecio lyratipartitus* to heal wounds (Kokwaro). Decoction used against dropsy. Dried leaves mixed with food for the same purpose (Kerharo). Fresh leaf or moistened dry leaf used as a wound dressing. As an antidote for snake bite. An infusion is drunk as an aid in child birth and a hot application applied to the vulva and abdomen. A feverish child is washed with a decoction to reduce temperature. The warm decoction mixed with salts is squeezed over wounds (Watt). *Fruit*: Used as an aid in child birth in the same way as the leaves (Watt). C: Mollic acid 3 β -D-glucoside (a saponin) has been isolated from the leaves and its structure determined (Pegel and Rogers, 1976). P: Extract of various organs have an antitumour activity towards sarcoma 180 (Kerharo).

Combretum cfr. *pentagonum* Laws. Syn: *Combretum lasiopetalum* Engl. & Diels, *C. wakefieldii* Engl. TMP: 251. V: Msukusuku. L: Handeni district, Sindeni village. H: Tree. D: East and south tropical Africa. Med: Decoction of roots mixed with Mviru (cfr. *Vangueria infausta* Burchell, TMP 246) against hernia. Lit: U: *Roots*: Decoction drunk against hookworm, convulsions of the heart and dropsy. In porridge for treatment of gonorrhoea. To rinse the mouth for treatment of bleeding gums and loosening teeth. Chips externally for wound healing (Haerdi). Chewed roots or decoction used as an aphrodisiac (Kokwaro). *Leaves*: Decoction against hookworm, convulsions of the heart and dropsy. In porridge for treatment of gonorrhoea (Haerdi).

Combretum cfr. *xanthothyrsus* Engl. & Diels. Syn: *Combretum stenanthoides* Mildbr. TMP: 205. V: Mtundamchovu. L: Handeni district,

Magarimabovu village. H: Shrub. D: Tanzania, Mocambique. Med: Decoction of root against mental illness. Lit: U: *Roots*: Decoction drunk as an anthelmintic and aphrodisiac (Kokwaro).

Combretum zeyheri Sond. Syn: *Combretum glandulosum* F. Hoffm., *C. megalocarpum* Brenan, *C. oblongum* F. Hoffm., *C. platycarpum* Engl. & Diels, *C. rupicolum* Diels. TMP: 210. V: Mlamamweupe. L: Handeni district, Misima village. H: Tree. D: Tropical and south Africa. Med: Hot-water extract of root and stem bark added to porridge against diarrhoea and vomiting. Lit: U: *Roots*: In porridge for treatment of dysentery. Against toothache (Kokwaro). *Leaves*: Dried leaves smoked to cure cough (Kokwaro). Decoction used to drink, and externally to treat scorpion bites (Watt). *Stem bark*: Powdered bark in the vagina to arrest menstrual flow (Watt). C: The seeds contain *N*-methyl-L-tyrosine (Mwauluka *et al.*, 1975a) and L-3-(α -aminomethylphenyl)alanine (Mwauluka *et al.*, 1975b).

cfr. *Pteleopsis myrtifolia* (Laws.) Engl. & Diels. Syn: *Combretum myrtifolium* Laws., *Pteleopsis obovata* Hutch., *P. stenocarpa* Engl. & Diels, *P. variifolia* Engl. TMP: 191. V: Mgonji. L: Handeni district, Chanika village. H: Tree. D: Tropical and south Africa. Med: Decoction of roots boiled with chicken drunk against sterility or infertility. Lit: U: *Roots*: Decoction drunk for venereal diseases (Kokwaro). *Leaves*: Juice drunk against abortion. Juice mixed with leaf juice of *Royena amnicola* B. L. Burtt, drunk to treat dysentery (Haerdi).

Terminalia kilimandscharica Engl. Syn: ? *Terminalia canescens* Engl. TMP: 151. V: Mkulyungu, (Makonde). L: Korogwe district, Kijango village. H: Tree. D: East Africa. Med: Decoction of stem bark drunk against asthma and other types of cough, also used against pains, especially in back and loins. Lit: U: *Stem bark*: Decoction drunk for treatment of colds (Kokwaro).

Terminalia sericea Burch. ex DC. Syn: *Terminalia angolensis* O. Hoffm., *T. angolensis* Ficalho - nom. nud., *T. brosigiana* Engl. & Diels, *T. bubu* De Wild. & Ledoux, *T. fischeri* Engl., *T. nyassensis* Engl., *T. sericea* DC. var. *angolensis* Hiern, *T. sericea* DC. var. *huillensis* Hiern. TMP: 196. V: Mhungweluwala. L: Handeni district, Chanika village. H: Tree. D: Tropical and south Africa. Med: Decoction of roots against gonorrhoea. Lit: U: *Roots*: Decoction used to treat bilharzia and for stomach troubles (Kokwaro). To arrest purging. The decoction is given to a cow suffering from protracted parturition or retained placenta. The root is thought to be poisonous (Watt). *Stem bark*: The powdered bark is taken with mealie meal against diabetes (Watt). *Leaves*: One or two leaves chewed and the juice swallowed before eating *dintwa* (edible white ants). This prevents purgative effects of the ant meal (Watt). C: The triterpenoids sericic acid and sericoside are major constituents of the roots and their structures have been determined (Bombardelli *et al.*, 1974). The root also contains a hydroxy-

stilbene glycoside (Bombardelli *et al.*, 1975). The gum exudate of the plant has been investigated (Anderson and Bell, 1974). P: Sericic acid and sericoside have antiulcer, anti-inflammatory and cicatrizing activity (Mustich, 1975).

COMMELINACEAE

Commelina zambesiaca C. B. Cl. TMP: 140. V: Kong'ho, Ikongwe (Pare). L: Korogwe district, Mombo village. H: Herb. D: Tropical Africa. Med: To treat "Mchango" (swelling of the body) the patient is covered with a blanket and subjected to the vapours of boiling stems and leaves of the plant.

COMPOSITAE

Conyza pyrrhopappa A. Rich. subsp. *oblongifolia* (O. Hoffm.) Wild. Syn: *Microglossa oblongifolia* O. Hoffm. TMP: 98, 99, 107, 116, 193. V: Mshashu, Muuka. L: Korogwe district, Kwasemangube and Semangube villages. H: Shrub. D: East Africa. Med: Decoction of a mixture of roots (see below) against convulsions in children (similar to epileptic attacks), combined with roots from Mdimu, Hozandoguli and Reza, or with Mshwee (*Hoslundia opposita* Vahl., TMP 108), or with Mgusapungu and Mlenga. Decoction of roots against chest infections. Lit: U: *Roots*: Powdered roots are applied on swollen tonsils. Roots are also used to cure influenza (Kokwaro). *Leaves*: Infusion drunk for indigestion, malaria, as an emetic and as a purgative (Kokwaro). Decoction used as a fever remedy. Maceration used as an ophthalmic application in cattle and on sores. A toothache remedy (Watt).

Crassocephalum bojeri (DC.) Robyns. Syn: *Senecio bojeri* DC., *S. subscandens* Hochst. ex A. Rich. TMP: 138, (144). V: Leza, (Eza). L: Korogwe district, Mombo village. H: Climber. D: Tropical Africa, Madagascar. Med: A little water is added to ground leaves and stems, the mixture filtered, fresh milk and honey added to the filtrate and the mixture drunk against bilharzia. [Ash of leaves used against body sores, decoction of roots in combination with roots of Moza (*Sterculia* cfr. *stenocarpa* H. Winkler, TMP 133), Mvule (*Ficus* cfr. *vogelii* (Miq.) Miq., TMP 104), Mwinikanguu, Mwambaziwa and Fuiza (*Momordica calantha* Gilg, TMP 170) drunk against fever.] Lit: U: *Leaves*: Juice drunk for colds, for fever, for rheumatism and as an antidote (Kokwaro). Juice drunk as lactagogue and to treat malarial convulsions (brain malaria) in children (Haerdi).

cfr. *Crassocephalum vitellinum* (Benth.) S. Moore. Syn: *Gynura vitellina* Benth. TMP: 172. V: Uwenge. L: Lushoto district, Mambo village. H: Herb. D: Mountains of tropical Africa. Med: Decoction of roots and leaves in combination with roots of Mdagha (*Trimera grandiflora* (Hochst.) Warb. subsp. *tropica* (Burk) Sleum., TMP 171) drunk against sores in the mouth or the

body, accompanied by fever and sometimes profuse sweating (Kiguma). Lit: U: For treatment of a diseased eye (Kokwaro). As a gonorrhoea remedy. For suppurations of the skin and elsewhere. To improve the quality of the milk in a lactating woman (Watt). No special part of the plant is mentioned in these references.

Dichrocephala integrifolia (L.f.) O. Ktze. Syn: *Cotula bicolor* Roth., *Dichrocephala bicolor* (Roth.) Schlechtend., *D. latifolia* DC., *Hippia integrifolia* Linn., f. TMP: 179. V: Shinda kaya. L: Lushoto district, Mayo village. H: Herb. D: Tropical and subtropical Africa, Asia, southern Europe. Med: Decoction of leaves filtered and drunk against bloody diarrhoea and stomach ulcers. Lit: U: Powder of the dried herb is used to heal old wounds (Haerdi). Ground seeds mixed with cows' ghee rubbed on the head to heal sores resulting from cuts made to treat headache (Kokwaro).

Launaea cornuta (Oliv. & Hiern) C. Jeffrey. Syn: *Soncus bipontini* Aschers. var. ? *exauriculatus* Oliv. & Hiern, *S. exauriculatus* (Oliv. & Hiern) Hoffm. TMP: 139. V: Mchunga (Swahili), Mshunga. L: Korogwe district, Mombo village. H: Herb. D: Tropical Africa. Med: Extract in hot water of roots and leaves together with roots of Chigonde (cfr. *Cissampelos pareira* L. var. *orbiculata* (DC.) Miq., TMP 101) against epilepsy. Lit: U: *Roots*: Decoction drunk against gonorrhoea and ascariasis. Decoction and juice of the leaves drunk against stomach pains (Haerdi). Fresh roots chewed to cure swollen testicles. Decoction to treat typhoid (Kokwaro). *Leaves*: Juice dripped in the ear to stop pain (Haerdi). *Herb*: The plant is boiled with water and the extract used to wash the body in the treatment of measles (Kokwaro).

Microglossa pyrifolia (Lam.) O. Kunze. Syn: *Conyza heudelotii* Oliv. & Hiern, *C. pyrifolia* Lam., *Microglossa volubilis* DC., *Pluchea subumbellata* Klatt. TMP: 275. V: Kichuaghembe. L: Same district, Suji-Malindi village. H: Trailing sub-shrub. D: Africa and tropical Asia. Med: Decoction of root and root bark against epilepsy (Kabla Hajaungva). Lit: U: *Roots*: Decoction soaked up in a compress, applied to heal the wound resulting from cutting open a severe abscess (Haerdi). A cold-water extract is used to treat headache and colds (Kokwaro). The powdered root is used as a snuff to treat colds. The juice of the root used as eye drops, particularly in cataract. The crushed roots are mixed with shea butter and applied to eyelids to reduce swelling (Watt). *Leaves*: An infusion is used for malaria. It is bitter and acts also as an emetic. Pounded leaves are used to treat limb fractures (Kokwaro). The leaf is used for treatment of fractured limbs. The leaf is applied to the inside of the nose in man and cattle to treat coryza. An infusion of the leaf is taken for fever with headache. The juice of the warmed leaf is used as eye drops and as a ringworm application (Watt). *Entire plant*: For relief of stomach pains, pain in the head, chest and shoulders with chronic rhinitis and as a remedy for chronic cough with fever, for heartburn,

for epilepsy and fits in children, for hookworm, for furunculosis and for impotence. A decoction for yellow fever, blackwater fever and dropsy. As an anthelmintic and as a cough remedy (Watt).

Pluchea dioscorides DC. Syn: *Baccharis aegyptiaca* Forsk., *B. dioscoridis* L., *Blumea baccharoides* Sch. Bip., *Conyza baccharoides* Sch. Bip., *C. dioscoridis* Rauw., *C. modatensis* Sch. Bip. TMP: 267. V: Mnywenywe. L: Handeni district, Segera-Michungwani village. H: Shrub. D: Egypt to South Africa, Palestine. Med: Decoction of root bark and cooking fat (a few drops) drunk against "Kizuka" (sterility in women) and impotence in men. Lit: U: *Roots*: Decoction to treat colds. The root and leaves are a stimulant, comforting medicine and an aromatic (Watt). *Leaves*: A decoction is used for curing children and infantile ailments (Kokwaro). C: The plant contains β -amyrin, β -amyrinacetate, hexacosanol, octacosanol, tetracosanol and the sterols stigmasterol, campesterol and cholesterol (Hammouda *et al.*, 1978). A new sesquiterpene lactone has been isolated and its structure determined (Bohlmann and Grenz, 1969). The same authors also isolated known thienyl-acetylene compounds from the plant. A macroscopic and microscopic description of the plant has been published as well as a general analysis of the plant. The leaves contain 0.5% essential oil. The plant contains 10% of tannins including protocatechuic acid, *d*-catechin and *l*-epicatechin (Cardosa do Vale *et al.*, 1961).

Psiadia punctulata (DC.) Vatke. Syn: *Nidorella punctulata* DC., *Psiadia aparine* Muschler, *P. arabica* Jaub. & Spach., *P. resiniflora* Schultz Bip., *P. vernicosa* Schinz. TMP: 166. V: Mpalaghasha. L: Lushoto district, Mambo village. H: Shrub. D: East and South Africa, Arabia. Med: Roots and leaves ground to powder and mixed with honey smeared on tongue against epilepsy; decoction of roots with roots of Mshashu (*Conyza pyrrhopappa* A. Rich. subsp. *oblongifolia* (O. Hoffm.) Wild, TMP 116) drunk for the same purpose. Lit: U: *Leaves*: Decoction drunk for abdominal pains. Pounded leaves used for treatment of colds in the head (Kokwaro).

Vernonia colorata (Willd.) Drake. Syn: *Eupatorium coloratum* Willd., *Vernonia senegalensis* Less. TMP: 95. V: Mhasahanda. L: Korogwe district, Kwasemangube village. H: Shrub. D: Tropical Africa. Med: Decoction of roots with roots of Msuzza, Msegese, Mkongolo and Mtulankhondo against swellings (tumours?) in legs, arms and chest. Lit: U: *Roots*: Decoction drunk against gonorrhoea. Small chips of the root mixed with ricine oil for rubbing against scabies (Haerdi). Decoction used as an antidote for general poisoning or dripped into the ear to cure earache (Kokwaro). As an emetic, antifebrile and a cough remedy (Watt). For bilharzia, sterility and frigidity (Kerharo). *Leaves*: Decoction used to rinse the mouth for tonsillitis (Haerdi). For treatment of coughs (Kokwaro). As a febrifuge and against gastritis. Vapours of boiling leaves and inflorescence inhaled in treatment of epilepsy (Kerharo). The juice is used for the treatment of gastrointestinal affections and for

blenorhoea (Bouquet, 1969). Decoction used against stomach pain and for blenorhoea (Sandberg, 1965). *Stem bark*: Against bilharzia, sterility and frigidity (Kerharo). *Entire plant*: As febrifuge, vermifuge against ascaris and for treatment of icterus (Bouquet and Debray, 1974). C: The plant contains the sesquiterpene lactones vernolide and hydroxyvernolide (Ho and Toubiana, 1970; Toubiana, 1969; Toubiana and Gaudemer, 1967). The leaves have given negative tests for alkaloids, quinones, saponins, flavonoids, tannins and steroids (Bouquet and Debray, 1974). On the other hand, Haerdi (1964) reports positive tests for alkaloids and saponins in an extract of the entire plant including the roots. Alkaloids have been found in the root (Kerharo). Patel and Rowson (1964) obtained a positive reaction for cardiac glycosides in roots, leaves and stems. Tests for alkaloids in these plant parts were negative. P: The extract of the plant is hypotensive (Kerharo). The water-soluble part of the ethanol extract of roots, leaves and stems has cardiotonic activity (Patel and Rowson, 1964). Vernolide has cytostatic activity *in vitro* (Toubiana and Gaudemer, 1967).

Vernonia hildebrandtii Vatke. Syn: *Gongrothamnus hildebrandtii* Oliv. & Hiern. TMP: 143. V: Uswaswaki. L: Korogwe district, Mombo village. H: Shrub. D: Tropical Africa. Med: Decoction of roots and leaves of Mguluka drunk against mental diseases. Lit: U: *Roots*: Decoction used as an emetic, for treatment of stomach trouble and to relieve strangulated hernia (Kokwaro). *Leaves*: Infusion used as a cough remedy (Kokwaro). As a diarrhoea remedy (Watt). C: The leaf is supposed to contain an alkaloid (Watt).

Vernonia jugalis Oliv. & Hiern. TMP: 176. V: Mhasha. L: Lushoto district, Mambo village. H: Shrub. D: East Africa. Med: See *Vernonia lasiopis*. Used in combination with other plants. Lit: U: *Roots*: To promote birth (Kokwaro). *Leaves*: For stomach trouble (Kokwaro). *Entire plant*: Decoction to cure epilepsy (Kokwaro).

Vernonia lasiopis O. Hoffm. Syn: *Vernonia alboviolaceae* De Wild., *V. braunii* Muschler, *V. brownii* S. Moore, *V. dumicola* S. Moore, *V. iodocalyx* O. Hoffm., *V. kaessneri* S. Moore, *V. ruwenzoriensis* S. Moore. TMP: 174, 281. V: Mhasha. L: Lushoto district, Mambo village. H: Shrub. D: Tropical Africa. Med: Decoction of roots with roots of other plants such as Muumbiti, Muhumba, Mkwamba (*Securinea virosa* (Roxb. ex Willd.) Pax & K. Hoffm., TMP 105), Mdagha (*Trimera grandiflora* (Hochst.) Warb. subsp. *tropica* (Burk) Sleum., TMP 171), Mtulang'hondo when a woman cannot be pregnant in association with menstrual bleeding. Decoction of roots drunk to purify the milk of lactating women or to produce lactation. Lit: U: *Roots*: Decoction used to relieve stomach pains and as an aphrodisiac for men (Kokwaro). To facilitate childbirth (Watt). *Leaves*: Decoction used to treat stomach-ache and as a purgative (Kokwaro). Decoction to treat epilepsy and for abdominal troubles (Watt).

Vernonia usambarensis O. Hoffm. TMP: 282. V: Mpalwe. L: Same district, Suji village. H: Herb. D: Kenya, Tanzania. Med: Decoction of root against excessive menses.

CUCURBITACEAE

Cucumis melo L. Syn: *Cucumis cognatus* Cogn., *C. melo* L. var. *agrestis* Naud., *C. melo* L. var. *cultus* Kurz. TMP: 90. V: Atomiki. L: Tanga district, Kiomoni village. H: Vine. D: Uganda, Tanzania, N.E. tropical Africa, India; widely cultivated in most parts of the globe. Med: Seeds (?) administered rectally against venereal diseases, bilharzia and leprosy.

Momordica calantha Gilg. Syn: *Momordica umbellata* (Cogn.) A. Zimm., *Peponia umbellata* Cogn., *Peponium umbellatum* (Cogn.) Engl. TMP: 170. V: Fuiza. L: Lushoto district, Mambo village. H: Prostrate herb. D: E. Africa. Med: Dried leaves and stems powdered, mixed with honey and given (orally) against asthma, headache and stomach-ache.

Acknowledgements

This work was supported by grants from SAREC and the Tanzanian National Scientific Research Council. Our thanks are due to all officials of the CCM party and the government in the districts of Tanga, Korogwe, Lushoto, Handeni and Same for all their help in establishing contact with the healers and in solving a lot of practical problems. Finally, we also want to express our gratitude to all the healers who made this survey possible.

References

- Akhmedkhodzhaeva, Kh. G., Kurmukov, A. G. and Sultanov, M. B., Comparative action of indole alkaloids from *Vinca* plants on the blood sugar level and on experimental hyperglykemia. *Farmakologiya Alkaloidov Serdechnykh Glikozidov*, (1971) 17 - 23. From *Chemical Abstracts*, 78 (1973) 119186r.
- Anderson, D. M. W. and Bell, P. C., Uronic acid materials. XLIV. Composition and properties of the gum exudates from *Terminalia sericea* and *T. superba*, *Phytochemistry*, 13 (1974) 1871 - 1874.
- Basu, N. K., The chemical constitution of achyranthine. *Journal and Proceedings of the Institution of Chemists (India)*, 29 (1957) 73 - 76.
- Berthold, R., Wehrli, W. and Reichstein, T., Die Cardenolide von *Parquetina nigrescens* (Afzel.) Bullock, Glykoside und Aglykone, 270. Mitteilung, *Helvetica Chimica Acta*, 48 (1965a) 1634 - 1658.
- Berthold, R., Wehrli, W. and Reichstein, T., Die Cardenolide von *Parquetina nigrescens* (Afzel.) Bullock. 3. Mitt. Die Konstitution 5 neuer Cardenolide (16-Dehydrostrophanthidin und verwandte Substanzen). Glykoside und Aglykone 271. Mitteilung. *Helvetica Chimica Acta*, 48 (1965b) 1659 - 1665.
- Blanpin, O., Quevauviller, A. and Pontus, C., Voacangine, an alkaloid of *Voacanga africana*. *Therapie*, 16 (1961) 941 - 945.

- Bohlmann, F. and Grenz, M., Terpenes from higher plants. IX. New sesquiterpene lactone from *Pluchea dioscorides*. *Tetrahedron Letters*, (1969) 5111 - 5112. From *Chemical Abstracts*, 72 (1970) 55684t.
- Bombardelli, E., Bonati, A., Gabetta, B. and Mustich, G., Plants of Mozambique. VII. Triterpenoids of *Terminalia sericea*. *Phytochemistry*, 13 (1974) 2559 - 2562.
- Bombardelli, E., Martinelli, E. M. and Mustich, G., Plants of Mozambique. IX. New hydroxystilbene glycoside from *Terminalia sericea*. *Fitoterapia*, 46 (1975) 199 - 200. From *Chemical Abstracts*, 84 (1976) 122219h.
- Bouquet, A., Féticheurs et médecines traditionnelles du Congo (Brazzaville). Office de la Recherche Scientifique et Technique Outre-Mer (O.R.S.T.O.M.). *Memoires O.R.S.T.O.M.*, No. 36, Paris, 1969.
- Bouquet, A., Plantes médicinales du Congo-Brazzaville. *Travaux et Documentes de l'O.R.S.T.O.M.*, No. 13, 1972.
- Bouquet, A. and Debray, M., Plantes médicinales de la cote d'Ivoire. *Travaux et Documentes de l'O.R.S.T.O.M.*, No. 32, 1974.
- Budzikiewicz, H., Djerassi, C., Pusieux, F., Percheron, F. and Poisson, J., Alcaloïdes des *Voacanga*: contribution à la structure de la voacamine et de la voacorine. Observations sur les spectres de masse de la vobasine et de ses dérivés. Application de la spectrométrie de masse aux problèmes de détermination de structure et de stéréochimie (Partie XXXVIII). *Bulletin de la Société Chimique de France*, (1963) 1899 - 1904.
- Cardosa do Vale, J., Fernandes Costa, A. and Maia e Vale, M. A., *Pluchea dioscoridis*, an aromatic composite from the flora of Angola. *Garcia Orta*, 9 (1961) 491 - 499. From *Chemical Abstracts*, 61 (1964) 12326a.
- Cole, J. R., Torrance, S. J., Wiedhopf, R. M., Arora, S. K. and Bates, R. B., Uvaretin, a new antitumor agent from *Uvaria acuminata* (Annonaceae). *Journal of Organic Chemistry*, 41 (1976) 1852 - 1855.
- Goutarel, R., Monseur, X. and Le Men, J., On the alkaloids of *Diplorrhynchus mossambicensis*. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, 253 (1961) 485 - 487. From *Chemical Abstracts*, 56 (1962) 7373c.
- Gropalchari, R. and Dhar, M. L., Studies in the constitution of the saponin from seeds of *Achyranthes aspera*. I. Identification of the saponin. *Journal of Scientific and Industrial Research (India)*, 17B (1958) 276 - 278.
- Gupta, S. S., Bhagwat, A. W. and Ram, A. K., Cardiac stimulant activity of the saponin of *Achyranthes aspera*. *Indian Journal of Medical Research*, 60 (1972) 462 - 471.
- Haerdi, F., Die Eingeborenen-Heilpflanzen des Ulanga-Distriktes Tangajikas (Ostafrika). *Acta Tropica*, Suppl. 8 (1964) 1 - 278.
- Hammouda, F. M., Rizk, A. M., Seif El-Nasr, M. M. and El-Kady, S. E. M., Phytochemical investigation of *Conyza dioscoridis* and *C. aegyptica*. *Fitoterapia*, 49 (1978) 51 - 52.
- Harjula, R., *Mirau and His Practice. A Study of the Ethno-medicinal Repertoire of a Tanzanian Herbalist*, Tri-Med Books Ltd., London, 1980.
- Ho, C. M. and Toubiana, R., Sesquiterpene lactones. Determination of lactone ring position in vernolide and hydroxyvernolide. *Tetrahedron*, 26 (1970) 941 - 947. From *Chemical Abstracts*, 72 (1970) 100920e.
- Janot, M.-M. and Goutarel, R., Chimie végétale. Alcaloïdes des *Voacanga*: voacamine et vobtusine. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, 240 (1955a) 1719 - 1720.
- Janot, M.-M. and Goutarel, R., Chimie végétale. Alcaloïdes des *Voacanga*: voacangine. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, 240 (1955b) 1800 - 1801.
- Jessenie, M. G., Bezanger-Beauquesne, L., Pinkas, M. and Troin, F., Gums of two gum resins, bdellium and galbanum. *Plantes Médicinales et Phytothérapie*, 8 (1974) 241 - 249. From *Chemical Abstracts*, 83 (1975) 40173d.
- Kapoor, V. K. and Singh, H., Investigation of *Achyranthes aspera* Linn.. *Indian Journal of Pharmacy*, 29 (1967) 285 - 288.
- Kerharo, J. and Adam, J. G., *La Pharmacopée Sénégalaise Traditionnelle*, Vigot Frères, Paris, 1974.
- Khastgir, H. N. and Sengupta, P., Oleanolic acid from *Achyranthes aspera*, Linn. *Journal of the Indian Chemical Society*, 35 (1958) 529 - 530.
- Khastgir, H. N., Sengupta, S. K. and Sengupta, P., The saponin from seeds of *Achyranthes aspera*, Linn. *Journal of the Indian Chemical Society*, 35 (1958) 693 - 694.
- Kingston, D. G. I., Plant anticancer agents VII: Structural effects on cytotoxicity of bisindole alkaloids of voacamine type. *Journal of Pharmaceutical Sciences*, 67 (1978) 272 - 274.
- Kokwaro, O., *Medicinal Plants of East Africa*, East African Literature Bureau, Kampala, Nairobi, Dar es Salaam, 1976.
- Kunesch, N., Das, B. C. and Poisson, J., Alcaloïdes des *Voacanga* VII. Structure de la voaphylline. *Bulletin de la Société Chimique de France*, (1967a) 2155 - 2160.
- Kunesch, N., Das, B. C. and Poisson, J., L'hydroxyindolénine de la voaphylline, nouvel alcaloïde des feuilles du *Voacanga africana* Stapf. *Bulletin de la Société Chimique de France*, (1967b) 3551 - 3552.
- Kunesch, M., Miet, C., Trolly, M. and Poisson, J., Alcaloïdes des *Voacanga* VIII. Alcaloïdes de feuilles et des graines du *Voacanga africana* Stapf. *Annales Pharmaceutiques Françaises*, 26 (1968a) 79 - 86.
- Kunesch, N., Poisson, J. and Das, B. C., *Voacanga* alkaloids X. Structure of two new dimer alkaloids from *Voacanga africana*. *Tetrahedron Letters*, (1968b) 1745 - 1750. From *Chemical Abstracts*, 69 (1968) 10610n.
- Kunesch, N., Das, B. C. and Poisson, J., Alcaloïdes des *Voacanga*. XI. Structures des bases bis-indoliques des feuilles du *Voacanga africana* Stapf. *Bulletin de la Société Chimique de France*, (1970) 4370 - 4375.
- Kunesch, N., Poisson, J. and Guilhem, J., Configuration of voaphylline and its derivatives. *Bulletin de la Société Chimique de France*, (1971) 1919 - 1920. From *Chemical Abstracts*, 75 (1971) 64063d.
- Liang, X.-T., Yu, D.-Q., Wu, W.-L. and Deng, H.-C., Structure of yingzhaosu A. *Hua Hsueh Hsueh Pao*, 37 (1979a) 215 - 230. From *Chemical Abstracts*, 92 (1980) 146954k.
- Liang, X.-T., Yu, D.-Q. and Pan, W.-D., Structure of yingzhaosu B. *Hua Hsueh Hsueh Pao*, 37 (1979b) 231 - 240. From *Chemical Abstracts*, 92 (1980) 164104n.
- Mauli, R. and Tamm, Ch., Die Glykoside von *Periploca nigrescens* Afzel. 2. Mitteilung. Glycoside und Aglykone, 171. Mitteilung. *Helvetica Chimica Acta*, 40 (1957) 299 - 305.
- Monseur, X., Goutarel, R., Le Men, J., Wilson, J. M., Budzikiewicz, H. and Djerassi, K., Alkaloids of *Diplorrhynchus condylocarpon* subsp. *mossambicensis* (Benth.) Duvign. (Apocynaceae). 2. Structure of mossambine (diplorrhynchine). *Bulletin de la Société Chimique de France*, (1962) 1088 - 1092. From *Chemical Abstracts*, 57 (1962) 11257e.
- Mustich, G., Terpenes. Patent Ger. Offen 2, 503, 135 (Cl. C07C, A61K) 31 Jul 1975, Brit. Appl. 4042/74, 29 Jan 1974, 35 pp.
- Mwauluka, K., Bell, E. A., Charlwood, B. V. and Briggs, J. M., N-Methyl-L-tyrosine from seeds of *Combretum zeyheri*. *Phytochemistry*, 14 (1975a) 1657 - 1658.
- Mwauluka, K., Charlwood, B., Briggs, J. M. and Bell, E. A., L-3-(3-aminomethylphenyl)-alanine, a new amino acid from seeds of *Combretum zeyheri*. *Biochimie und Physiologie der Pflanzen*, 168 (1975b) 15 - 18.
- Nasirov, S. Kh., Sultanov, M. B. and Saidkasymov, T., Effect of tombozine alkaloid on the bioelectric activity of different formations of rabbit brain. *Doklady Akademii Nauk Uzbekskoi SSR*, 23 (1966) 38 - 40. From *Chemical Abstracts*, 65 (1966) 12743h.
- Neogi, N. C., Garg, R. D. and Rathor, R. S., Preliminary pharmacological studies on achyranthine. *Indian Journal of Pharmacy*, 32 (1970) 43 - 46.

- O'Kelly, J. and Sargeant, K., Supinine from the seeds of *Trichodesma zeylanicum*. *Journal of the Chemical Society*, (1961) 484.
- Pakrashi, A. and Bhattacharya, N., Abortifacient principle of *Achyranthes aspera* Linn. *Indian Journal of Experimental Biology*, 15 (1977) 856 - 858.
- Paris, R. and Moyse-Mignon, H., Leaves of baobab, *Adansonia digitata*; chemical composition and physiological action. *Annales Pharmaceutiques Françaises*, 9 (1951) 472 - 479. From *Chemical Abstracts*, 46 (1952) 2239h.
- Patel, M. B. and Rowson, J. M., Investigations of certain Nigerian medicinal plants. Part I. Preliminary pharmacological and phytochemical screenings for cardiac activity. *Planta Medica*, 12 (1964) 33 - 42.
- Pegel, K. H. and Rogers, C. B., Mollic acid 3- β -D-glucoside, a novel 1- α -hydroxycycloartane saponin from *Combretum molle* (Combretaceae). *Tetrahedron Letters*, 47 (1976) 4299 - 4302.
- Percheron, F., Contribution à l'étude de quelques alcaloïdes de l'*Iboga* et du *Voacanga* (Apocynacées). *Annales de Chimie (Paris)*, 4 (1959) 303 - 364.
- Pernet, R., Les plantes médicinales malgaches. Catalogue de nos connaissances chimiques et pharmacologiques. *Mémoires de l'Institut Scientifique de Madagascar, Série B, VIII* (1957).
- Pusieux, F., Devissaguet, J. P., Miet, C. and Poisson, J., Alcaloïdes de *Voacanga*. V. N-Oxy-voacamine. *Bulletin de la Société Chimique de France*, (1967) 251 - 253.
- Quevauviller, A., Goutarel, R. and Janot, M.-M., Données pharmacodynamiques préliminaires sur les alcaloïdes totaux des *Voacanga* (Apocynacées). *Annales Pharmaceutiques Françaises*, 13 (1955) 423 - 424.
- Quevauviller, A. and Blanpin, O., Etude pharmacodynamique comparée de la voacamine et de la voacarine, alcaloïdes du *Voacanga africana* Stapf (Apocynacées). *Annales Pharmaceutiques Françaises*, 15 (1957a) 617 - 630.
- Quevauviller, A. and Blanpin, O., Pharmacodynamic study of voacamine, an alkaloid of *Voacanga africana*. *Thérapie*, 12 (1957b) 635 - 647. From *Chemical Abstracts*, 53 (1959) 10554b.
- Quevauviller, A. and Takenaka, Y., Physiological effects of tombozine, an alkaloid of *Diplorrhynchus mossambicensis*. *Journal de Physiologie (Paris)*, 54 (1962) 403 - 404. From *Chemical Abstracts*, 57 (1962) 7392a.
- Ram, A. K., Bhagwat, A. W. and Gupta, S. S., Effect of the saponin of *Achyranthes aspera* on the phosphorylase activity of the rat heart. *Indian Journal of Physiology and Pharmacology*, 15 (1971) 107 - 110.
- Rao, K. V., Alkaloids of *Voacanga africana* Stapf. I. Voacafrine and voacaficine—two new alkaloids. *Journal of Organic Chemistry*, 23 (1958) 1455 - 1456.
- Raponda-Walker, A. and Sillans, R., *Les Plantes Utiles du Gabon*, Editions Paul Lechevalier, Paris, 1961.
- Raymond-Hamet, Pharmacological properties of an alkaloid recently extracted from *Stemmadenia donell-smithii*. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, 251 (1960) 2098 - 2100. From *Chemical Abstracts*, 55 (1961) 9643i.
- Raymond-Hamet, Total extract of *Diplorrhynchus mossambicensis*, useful as sympatholytic. *Fr. M.* 5689 (Cl. A. 61k), 12 Feb 1968, Appl. 25 Aug 1966, 2 pp. From *Chemical Abstracts*, 71 (1969) 53587u.
- Renner, U., Voacamidin und voacristine, zwei neue Alkaloide aus *Voacanga africana* Stapf. *Experientia*, 13 (1957) 468 - 469.
- Renner, U., Vobasin und Voacryptin, zwei neue Alkaloide aus *Voacanga africana* Stapf. *Experientia*, 15 (1959) 185 - 186.
- Renner, U. and Prins, D. A., Voacanga-Alkaloide III. Voacristin: Identität mit Voacangarin und Abbau zu Iboxygain und Ibogain. *Experientia*, 15 (1959) 456.
- Renner, U. and Prins, D. A., Struktur von Voacryptin und Voacristin. *Experientia*, 17 (1961) 106.
- Renner, U., Prins, D. A., Burlingame, A. L. and Biemann, K., Die Struktur der 2-Acylindol-Alkaloide Vobasin, Dregamin und Tabernaemontanin. *Helvetica Chimica Acta*, 46 (1963) 2186 - 2208.
- Rolland, Y., Kunesch, N., Poisson, J., Hagaman, E. W., Schell, F. M. and Wenkert, E., Voacanga alkaloids. 16. Carbon-13 nuclear magnetic resonance spectroscopy of naturally occurring substances. 43. Carbon-13 nuclear magnetic resonance analysis of bis-indoline alkaloids of two *Voacanga* species. *Journal of Organic Chemistry*, 41 (1976) 3270 - 3275.
- Sadritdinov, F., Sultanov, M. B. and Saidkasymov, T., Effect of tombozine on the conditioned reflex activity of rats. *Doklady Akademii Nauk Uzbekskoi SSR*, 24 (1967) 62 - 63. From *Chemical Abstracts*, 68 (1968) 67621a.
- Sandberg, F., Etude sur les plantes médicinales et toxiques d'Afrique équatoriale. I. Premier inventaire des plantes médicinales et toxiques de la région sud-ouest de la République Centrafricaine et de la région nord de la République du Congo/Brazzaville. *Cahiers de la Maboke*, T. III, Fasc. 1 (1965) 5 - 49.
- Schenker, E., Hunger, A. and Reichstein, T., Die Glykoside von *Periploca nigrescens* Afzel. Glykoside und Aglykone 134. Mitteilung. *Helvetica Chimica Acta*, 37 (1954) 1004 - 1036.
- Singbartl, G., Zetler, G. and Schlosser, L., Structure-activity relation of intracerebrally injected tremorigenic indole alkaloids. *Neuropharmacology*, 12 (1973) 239 - 244. From *Chemical Abstracts*, 79 (1973) 110s.
- Stauffacher, D., Alkaloide aus *Diplorrhynchus condylocarpon* (Muell. Arg.) Pichon ssp. *mossambicensis* (Benth.) Duvign. *Helvetica Chimica Acta*, 44 (1961) 2006 - 2015.
- Stauffacher, D. and Seebeck, E., Voacangarin ein neues Alkaloid aus *Voacanga africana* Stapf. *Helvetica Chimica Acta*, 41 (1958) 169 - 180.
- Sultanov, M. B., Results and aspects of a pharmacological study of indole alkaloids from plants of the genus *Vinca*. *Aktualnye Problemy Farmakologii i Farmatsii, Vsesoyuznaya Nauchnaya Konferentsiya*, (1971) 159 - 168. From *Chemical Abstracts*, 76 (1972) 111f.
- Sultanov, M. B. and Saidkasymov, T., Pharmacology of tombozine. *Doklady Akademii Nauk Uzbekskoi SSR*, 22 (1965) 41 - 42. From *Chemical Abstracts*, 63 (1965) 13853f.
- Sultanov, M. B. and Saidkasymov, T. K., Pharmacology of the alkaloid tombozine, extracted from the above-ground part of *Vinca erecta*. *Farmakologiya Alkaloidov Serdechnykh Glikozidov*, (1971) 3 - 17. From *Chemical Abstracts*, 77 (1972) 109456u.
- Thomas, D. W. and Biemann, K., The alkaloids of *Voacanga africana*. *Lloydia*, 31 (1968a) 1 - 8.
- Thomas, D. W. and Biemann, K., The hydroxyindolenine derivative of voacangine, a new indole alkaloid from *Voacanga africana*. *Tetrahedron*, 24 (1968b) 4223 - 4231. From *Chemical Abstracts*, 69 (1968) 10604p.
- Toubiana, R., Structure of hydroxyvernolide, a new sesquiterpene ester from *Vernonia colorata*. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Série C*, 268 (1969) 82 - 85. From *Chemical Abstracts*, 70 (1969) 87978s.
- Toubiana, R. and Gaudemer, A., Structure of vernolide, a new sesquiterpenoid ester isolated from *Vernonia colorata*. *Tetrahedron Letters*, (1967) 1333 - 1336. From *Chemical Abstracts*, 67 (1967) 32814t.
- Vincent, D., Séro, I. and Brygoo, P., Some new data on the pharmacology of *Adansonia* leaves. *Toulouse Medical*, 47 (1946) 508 - 509. From *Chemical Abstracts*, 45 (1951) 1690i.
- Vogel, G. and Uebel, H., Zur Pharmakologie der Alkaloide aus *Voacanga africana* Stapf. *Arzneimittel-Forschung*, 11 (1961) 787 - 793.
- Watt, J. M. and Breyer-Brandwijk, M. G., *Medicinal and Poisonous Plants of Southern and Eastern Africa*, 2nd edn., E. & S. Livingstone Ltd., Edinburgh, London, 1962.
- Zetler, G. and Singbartl, G., Inhibition of cardiac effects of noradrenaline by eleven indole alkaloids, two azepinoindoles, quinidine, quindonium and propranolol. *Pharmacology*, 4 (1970) 129 - 142.

- Zetler, G. and Unna, K. R., Central effects of voacangine, voacamine, voacamidine, voacoline and ibogaine. *Archiv für Experimentelle Pathologie und Pharmakologie*, 236 (1959) 122 - 123. From *Chemical Abstracts*, 53 (1959) 12480h.
- Zetler, G., Lenschow, E. and Prenger-Berninghoff, W., The actions of 11 indole alkaloids on the guinea pig heart *in vivo* and *in vitro*, compared with those of 2 synthetic azepinoindoles, quinidine and quindonium. *Naunyn-Schmiedeberg's Archiv für Pharmakologie und Experimentelle Pathologie*, 260 (1968) 26 - 49. From *Chemical Abstracts*, 69 (1968) 17907y.

THE PHARMACOLOGICAL EFFECTS OF A LIGROIN EXTRACT OF NUTMEG (*MYRISTICA FRAGRANS*)

C. J. SHERRY, L. E. RAY and R. E. HERRON

Department of Biology, Texas A&M University, College Station, Texas 77843 (U.S.A.)

(Received in revised form June 12, 1981; accepted October 1, 1981)

Summary

A ligroin extract of nutmeg (*Myristica fragrans*) caused a significant increase in the duration of light and deep sleep in the young chicken. The presence of trimyristin tended to increase the effect of the extract. The extract did not contain detectable amounts of myristicin, elemicin, safrole, or eugenol, which either individually or collectively have been suggested to be the active agent of nutmeg.

Whole or ground nutmeg (*Myristica fragrans* Houtt.) is readily available from a wide variety of sources. The oil of nutmeg (*i.e.* the steam distillate), while not as available as the spice, is also available to the average consumer from a number of sources (for example, herb stores, *etc.*). It has been suggested that nutmeg, when consumed in sufficient quantities (about 20 g or 2 - 3 whole nutmegs), acts as an hallucinogen (Truitt *et al.*, 1961; Weil, 1965). However, when consumed in sufficient quantities to obtain psychotropic effect, mild to severe gastrointestinal reactions are frequently reported (Truitt *et al.*, 1961; Weil, 1965). But it has been suggested that the nutmeg, devoid of its volatile oil, may retain the gastrointestinal properties but not the psychotropic properties (Truitt *et al.*, 1961). While nutmeg, its essential oil, and the aromatic constituents of the essential oil (*i.e.* myristicin, safrole, *etc.*) have received some attention in the literature (Shulgin *et al.*, 1967; Truitt, 1967; Kalbhen, 1971), there are apparently no reports of the pharmacological effects of the solvent extracts of nutmeg. Since solvent extraction is a relatively simple means of obtaining organic compounds, it is likely that drug experimenters may use this approach to obtain the fraction maximizing the psychotropic effect while minimizing the gastrointestinal effects. We decided to determine the pharmacological effects of the ligroin extract of nutmeg and the residue left after extraction. Since the young chick is relatively susceptible to the effects of oil of nutmeg (Sherry and Burnett, 1978), as well as other hallucinogens (Sherry and Hunter, 1979; Sherry and Koontz, 1979), we obtained the data in this preparation.